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JOURNAL
OF THE
ASIATIC SOCIETY
OF
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BENGAL.

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VOL. XI.

PART II. JULY TO DECEMBER, 1842.

NEW SERIES.

"It will flourish, if naturalists, chemists, antiquaries, philologists, and men of science, in different parts of *Asia* will commit their observations to writing, and send them to the Asiatic Society in Calcutta; it will languish, if such communications shall be long intermitted; and will die away, if they shall entirely cease."—SIR WM. JONES.

CALCUTTA:
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A Monograph of the Indian and Malayan species of Cuculidæ, or Birds of the Cuckoo family. By EDWARD BLYTH, Curator of the Asiatic Society.

In the present state of Indian Ornithology, there is nothing so much required, as a series of carefully prepared monographs of various groups, in which the object should be less to describe new species, than to attempt an analysis of those which have been already made known, more or less satisfactorily, by numerous writers, whose information at present lies scattered in a great variety of works, many of difficult access, and others in which few would think of looking for notices of the kind. In proceeding to offer a series of such monographs, I am quite sensible of my own deficiencies, arising alike from a paucity of expensive works of reference, and from the circumstance of my having so recently commenced the more especial study of Indian zoology; but, on the other hand, the peculiar advantages of my position afford considerable facilities for the undertaking, and I am desirous to commence at once, and publish with as little delay as practicable, such information on many groups as will enable students of zoology in this country to turn their observations to more account, by letting them know whitherto their attention can be advantageously directed, hoping thus to elicit from them those various additional details, which, were I to postpone the publication of these monographs until my own researches should have supplied me with all such desiderata, there would be little chance of their ever appearing at all, and even if they did appear,

it is very doubtful whether they would prove to be of as much practical utility.

The species of Indian *Cuculidæ* are rather numerous, and to these I shall first invite the attention of our zoologists, commencing with those members of restricted *Cuculus*, which, like the included European Cuckoo, have short and half-feathered tarsi—alone a sufficient indication of this particular group.

In the European species of this genus, the sexes are usually similar, though the female has generally some trace of barred markings on the sides of the neck, which are likewise present in a few of the young males of the preceding season, while they are absent in some old females; but I have seen one instance, and heard of others, wherein the adult (presumed) female of *Cuculus canorus* has been entirely clad in a barred livery, quite different from that of the young, and corresponding to the garb which seems to be the ordinary one of certain of its allied Indian congeners, in which state it has been described as a separate species by the name of *C. hepaticus*. A specimen of this kind has been noticed by my friend Mr. Thompson of Belfast, in the 'Proceedings of the Zoological Society' for 1834, p. 29; it was killed at the end of May, as was likewise that which fell under my observation; and it seems probable that the converse occasionally obtains with certain of the Indian species, some females of which may resemble the mature males in plumage, while perhaps the latter in some instances, at least on casting their first or nestling feathers, may assume a dress resembling what in them is the ordinary one of the other sex; this remains to be certified by actual observation.

At least five species of typical *Cuculus* inhabit this country, two of them being characterised by having a shorter and less graduated tail, and markings on the under-parts, which, as observed by Mr. Jerdon in the instance of one of them, have the same character as those of the Hawks, being longitudinal in the young bird, and becoming transverse with age: such are—

1. *C. sparveroides*, Vigors, *P. Z. S.* 1831, p. 173, — Gould's *Century*, pl. LIII.* (ACCIPITRINE CUCKOO.) Length about fifteen inches;

* Probably also the "Ferruginous-necked Cuckoo" of Latham, *Gen. Hist.* III., 269, though differing in the colour of the bill and feet, and in having the wings of ordinary length.

of wing eight inches and a half; and middle tail feathers eight inches, the outermost an inch and a quarter shorter; bill to forehead (through the feathers) an inch and one-sixteenth, and to gape an inch and a quarter; tarse seven-eighths of an inch. General hue of the upper-parts (in the specimen before me) a bronzed dark brown, but slightly tinged with ashy, though I think it probable that older birds would be greyer: crown, occiput, and sides of the upper-part of the neck, very dark ash-colour; the sides and front of the lower-part of the neck bright ferruginous, marked a little with dark ash, and white at the bases of the feathers; chin dark ashy, the throat white streaked with the same, mingled with rufous; lores also whitish: under-parts from the breast fulvescent-white, transversely streaked with dusky, but the vent and lower tail-coverts pure white, with one or two dark bands on only the longest feathers of the latter: tail of a paler brown than the back, and crossed with five dark bars, one of them basal, another subterminal (which is very broad), the extreme tip being whitish, and the penultimate dark bar much narrower than the others; the space immediately bordering the dark bars beyond them being paler than the rest and rufescent: primaries and secondaries obscurely marked on their outer webs with narrow bars of dull pale fulvous, and on their inner webs banded with white internally. Bill dusky horn-colour, with some yellow on the lower mandible; "the irides and feet both pale gamboge-yellow, the feet with a slight buff tinge" (Jerdon). A young specimen has all the upper-parts transversely barred with rufous, except the crown which is dark ashy without markings: under-parts fulvous-white, each feather having a mesial blackish streak: there are six dark bands upon the tail, and the rufous colour bordering them is more developed than in the adult: the head and throat are nearly as in the mature plumage.

Both this and the next species are included in the catalogue of Dr. Royle's birds procured at Saharunpore and in the Himalaya, as migratory, appearing in March; and the present would seem to be chiefly a mountain species. I have not yet met with it in Bengal, but Mr. Jerdon has lately procured two specimens in peninsular India, from which I have drawn up the foregoing descriptions. Of its particular habits and notes I can say nothing.

2. *C. fugax*, Horsfield, *Lin. Trans.* XIII. 178; *Bhrou* (i. e. *burra*

or large) and *Bychan Cuckoo*, and the young—*Sokagu Cuckoo*, of Latham, *Gen. Hist.* III., 264-5; *C. Lathamii*, Hardwicke and Gray; *C. radiatus* (?), Gmelin, or *le Coucou brun et jaune à ventre rayé*, Buffon, *Hist. Nat., Ois.*, VII., 379.* (WHISTLING CUCKOO.) Length thirteen inches and a half, by twenty-two inches in extent; wing from bend seven inches, and tail six inches and three quarters, its outermost feathers an inch and a half shorter than the middle ones: bill an inch and one-sixteenth to forehead (through the feathers), and an inch and a quarter to gape; tarse three quarters of an inch. Colour of the upper-parts uniform ash-grey, the winglet and coverts of the primaries darker: fore-neck and breast pale rufous, each feather light-grey in the centre: belly and flanks white, barred with adjoining lines of grey and rufous; the white hardly visible anteriorly, from the overlapping of the feathers: thighs, vent, and lower tail-coverts, pure white; the first a little barred: throat grey, and some white at the base of the bill and sides of the throat: tail grey, tipped with faint rufous and finally whitish; having a broad dusky subterminal band, and five other narrow undulating zigzag bands (one near the base), composed of a dusky bar and then a whitish one adjoining, with some traces of rufous: quills barred with white on their inner webs for the basal two-thirds or three-fourths of their length: bill dusky, the lower mandible, except at its extreme tip, and the sides of the base of the upper

* Since writing the above, I have seen Sonnerat's figure of his *Coucou à ventre rayé de l'Isle Panay*, and am less inclined to identify it with *C. fugax* than I was previously. It is described to be nearly as large as the European species, *having an even tail*: "the upper part of the head of a blackish-grey; throat and sides of the head vinaceous (*couleur de lie de vin*); breast dull orpiment-yellow, the belly faint yellow, and both barred with black; back and wings dull brown-black; the tail composed of feathers of even length, tipped with white, and marked with series of white round spots [upon the shafts], so arranged as to form [interrupted] bars: bill black; the irides pale orange; and feet reddish." Dr. Buchanan Hamilton referred the *C. fugax* to this species; and it appears that the latter has never been verified as distinct, to judge from every succeeding writer having copied from his predecessors.

One of the specimens referred by Latham to his *Sokagu* is described as having "the under-parts of the body to the thighs pale slate-colour," while the description of the back suits very well the young of *C. fugax*: another has "the body beneath pale ash-colour, marked with roundish black spots on the sides of the neck and body"; and a third has "all the under-parts dusky-white, marked with longitudinal streaks of pale brown," which agrees with all the young of *C. fugax* which I have seen no inconsiderable number. It remains for future observers to substantiate these various indications, which however, mostly resting on drawings of more or less questionable fidelity, their value is thereby much deteriorated.

one, wax-yellow: orbits brilliant gamboge-yellow; irides the same: feet comparatively dull yellow. An adult female had the bill pale-greenish at the basal half of the upper mandible, and on nearly the whole of the lower mandible, the rest being dusky; irides brownish-yellow. Size exactly that of the male, and plumage only differing in being less vividly coloured, the breast mottlings dingy and indistinct. The young have the irides paler and greenish; the usual rufous barring of the upper-parts not very distinct, being almost obsolete on the back, and chiefly visible on the wings and about the nape; head ashy; and the longitudinal markings of the lower-parts much less dark than in the preceding species. Very young birds have the bill wholly yellow.

This Cuckoo, originally discovered (if identical with *radiatus*) in the Phillipines, and since observed in Java by Dr. Horsfield, is very common in Bengal, and apparently throughout India—equally so with the British Cuckoo in England. It feeds largely on fruit, especially (as remarked by Mr. Jerdon) on the small figs of the banyan tree, but it also preys on caterpillars and other insects. It is a noisy bird, and has two or three different notes, the most remarkable of which is the shrill whistling *crescendo* note adverted to by Mr. Jerdon, and which Mr. Elliot endeavours to express by the sound "*whe-whe-wa, whe-whee-wa, whe-whe-e-wa*, uttered eight or ten times, and sometimes oftener; at first lower, and gradually rising till the later repetitions become extremely loud and shrill;"—indeed, so much so, that it is impossible for one's attention not to be aroused by it, and the bird often delivers this cry perched conspicuously upon a bare branch near the top of a high tree, being answered to, at times, by others, and not unfrequently two or three of them may be heard engaged in noisy contest, emitting then a continuously reiterated squeaking cry, which also increases gradually in loudness. This bird is the *Choke-dello* of the Bengalees, a name meant to be imitative of its note, but which is not very expressive of it.

3. *C. canorus*, Lin. (The EUROPEAN CUCKOO.) This species is tolerably common on the Himalayas, and Lieut. Tickell informed me that it is not rare in the jungles of Borabhúm and Dholbhúm, but Mr. Jerdon states that "it is seldom met with Southward of North latitude 20° [that is, in India, for in Africa I believe it is not unfrequent in the

Cape colony]. Its well known note was often heard in Goomsoor." Colonel Sykes mentions it as found, though rarely, in the Bombay Deccan; and Major Franklin designates it "the common Cuckoo of India": but I have never yet heard its note in the vicinity of Calcutta, though I possessed a living specimen for some months which was taken in the neighbourhood. It is a very rare bird, according to Dr. Horsfield, in Java, and in the specimens from that island "a very slight difference from the bird as it occurs in Europe is observed." Can it be, therefore, that the nearly allied *C. micropterus* is here mistaken for it? I possess an example of the latter from the Malay peninsula, and the Javanese *C. striatus* of M. Drapiez would seem to be no other. The *C. canorus* measures fourteen inches long, by twenty-six inches across; wing from bend eight inches and three-quarters, and tail seven inches, its outermost feathers two inches shorter; bill to forehead (through the feathers) an inch, and to gape an inch and three-sixteenths; tarse seven-eighths of an inch.

4. *C. micropterus*, Gould, *P. Z. S.* 1837, p. 137; probably *C. striatus*, Drapiez, *Dict. Class. d'Hist. Nat.* IV., 570* (1823); *Dunmun Cuckoo*, var. *A.*, Latham, *Gen. Hist.* III., 264,—that previously described by him being either a variety, or (more probably) merely an imperfectly moulted young specimen, retaining its nestling white-tipped larger wing-coverts,—erroneously (I presume) referred by this author to the *Coucou vulgaire d'Afrique* of Levaillant, or *C. gularis* figured and described in Shaw's *Zoology* (IX, 83), which would seem to be very closely allied. (GREAT-BILLED CUCKOO.) Differs from *C. canorus* in its inferior size, larger bill, the darker hue of its upper-parts, and differently coloured iris, while its note is very distinct: length of a male twelve inches and a half, by twenty-three inches

* "Taille, douze pouces. Parties supérieures d'un brun cendré, bleuâtre; remiges brunes, frangées de blanchâtre, le deux premières dentelées de roussâtre; rectrices peu etagées [if we except the outermost pair, this holds good in *C. micropterus*], noirâtres, avec l'extrémité et des taches le long de la tige blanches; gorge et devant du cou d'un cendré bleuâtre, très-clair; parties inférieures blanchâtres, rayées transversalement de noir; bec noir, roussâtre en dessous à sa base; pieds rougeâtres. De Java. On nous a communiqué sous le nom de *Cuculus dasypus*, un espèce de même taille venant également de Java, qui pourrait bien être le Coucou à ventre rayé [*striatus*] dans son jeune âge; il en diffère en ce que les parties supérieures sont toutes traversées de bandes rousses, et qui la gorge et la devant du cou sont semblables au restes des parties inférieures."

in extent ; wing from bend seven inches and a half, and tail six inches, the outermost feather two inches shorter : another specimen had the tail six inches and three-quarters long : bill to forehead (through the feathers) an inch and one-eighth, and to gape an inch and five-sixteenths ; tarse three-quarters of an inch. Bill coloured as in *C. canorus*, but the irides pale dusky, and the orbits and feet light wax-yellow : the abdominal cross-streaks are, also, usually broader and wider apart than in *C. canorus* ; but perhaps the most ready distinction is afforded by the comparative shortness of the wings. Colour of the upper-parts darker, and in old birds uniform pure dark ashy ; in specimens once moulted a bronzed ash-brown, with the head and neck grey, the throat and breast pale grey, and slight traces of rufous on the sides of the neck and on the wings. A young Malayan specimen has much white about the head, occupying the whole loreal feathers, broadly margining the lateral feathers of the crown, and passing backward as an ill-defined streak to the occiput ; ground-colour of the upper-parts dull brown, with a slight gloss of bronze ; the nuchal feathers having one broad bar of white, which is little seen from their overlapping, and slightly edged with pale rufous ; the interscapularies with a narrow single bar of pale rufous, and margined with the same ; scapularies, wing-coverts, and tertiaries, more broadly tipped with dull white, and together with the primaries and secondaries more or less barred or spotted with dingy rufous ; inner webs of the primaries marked with white, as in the adult ; the white markings on the shafts of the tail-feathers more developed, and the medial tail-feathers spotted with faint rufous along both margins ; the upper tail-coverts are barred with rufous and tipped with whitish, the lower almost spotless : underparts fulvous-white, barred with dusky, which latter is almost hidden on the throat and breast by the broad pale margins of the feathers.*

This bird is common on the Himalaya, and I was informed by Lieut. Tickell that it is of frequent occurrence in the neighbourhood of Chyebassa, in Central India, but I cannot find it recorded

* This young bird seems to agree, except in being a trifle smaller, with the *Brown Cuckoo* of Latham, *Gen. Hist.* III., 291. "Length thirteen inches, bill bent; general colour of the back and wings brown, mottled with white; head, neck, and underparts, white, with dusky markings; tail long, cuneiform, whitish, barred irregularly with dusky; legs bluish; toes before and behind tolerably hooked. Inhabits Ceylon."

in Mr. Jerdon's catalogue, though I doubt not it is occasionally met with throughout the wooded parts of the country. A specimen from the Malay peninsula has already been noticed, and I presume it to be the Javanese *C. striatus* of M. Drapiez, if not also Dr. Horsfield's Javanese slight variety of *C. canorus*; I also find it included in Mr. Vigne's catalogue of his collection of birds procured in Kashmir and Little Tibet (*Proc. Zool. Soc.*, January 26, 1841). About Calcutta it is not rare, though I have hitherto been able to procure but one recent specimen; but I have often heard the musical note of another in possession of a native, and from which is derived its Bengalee appellation of *Bocuttácko*. Lient. Tickell termed this a double repetition of the sound *cuckoo*, and the tone of utterance is much the same as in the last species, or it may be styled a melodious deep-toned whistle, agreeable to hear despite its monotonous reiteration. Among the natives this bird is an especial favorite. The captive specimen had the same pale feet and orbits, as compared with the European species, and light dusky irides, as in that which I procured for the Museum: but neither of these were in the final pure grey plumage, but in what I have described as their second dress. The name *Dunmun*, which according to Dr. Latham this species bears in Calcutta, seems to be quite unknown here.

5. *C. poliocephalus*, Latham, *Gen. Hist.* III., 181,—the grey old male; *C. Himalayanus*, Vigors, *P. Z. S.* 1831, p. 172,—Gould's *Century*, pl. LIV., but the tarse erroneously represented as unfeathered;—not of Jerdon, *Madr. Jour.* XI., 220: the female, or dress corresponding to that occasional livery of *C. canorus* upon which was founded the fictitious *C. hepaticus*. (SMALL HIMALAYAN CUCKOO.) Male exactly resembling the mature examples of the last species in colour, except that the specimen examined has a stain of rufous on the breast, as often happens in younger males, and especially females, of *C. canorus*, (though the bird here described had nearly quite assumed this livery for at least the second time); but the size is very much smaller, this measuring but ten inches to ten and a quarter in length, the wing five inches and seven-eighths, or commonly a trifle less, and tail five inches and one-eighth; bill from forehead eleven-sixteenths of an inch, and from gape an inch; tarse posteriorly five-eighths of an inch. It is possible that old females assume a similar garb; and that young males, once moulted,

do not differ in their colouring from ordinary females. The latter have all the upper-parts fine rufous-bay, spotless (or nearly so) on the forehead, sides of the neck, and rump, but elegantly barred with dusky across the scapularies, wings and tail, and faintly on the crown, hind-neck, and interscapularies: under-parts barred more broadly than in the male, including the lower tail-coverts, which in the male are spotless; the throat, fore-neck, and breast, whitish along the middle, and stained with rufous laterally, having also dark bars more or less distinct; and there are the same white markings along the shafts, and at the tips of the tail-feathers, as in the male of this in common with the foregoing species, which white markings are wanting in *C. niger* and probably *Sonneratii*. A specimen in full-grown nestling plumage has the bill shorter, less curved, and wholly black; and the plumage altogether as in the darker examples (which I believe are always females) of the young of *C. canorus*: the head, neck, and smaller wing-coverts, being dusky-black, margined, as is the whole upper plumage, with white; fore-neck and breast the same, but with a white bar across the middle of each feather; a similar bar, but faint rufous, across the scapularies and interscapularies, and two or more such bars on the upper tail-coverts; tail as in the female, but having the white markings more produced, as are also the rufous bars of the primaries.

Upon a former occasion, I referred this species to *C. Sonneratii*,* but have since met with another from peninsular India which I cannot doubt is the latter, while the adult male of the present one is distinctly the *C. poliocephalus* of Latham. It appears to be peculiar to the Himalaya, and the specimens here described are from Darjeeling. I have been informed that its note is proportionally very loud.†

* Vol. XI, p. 168.

† Here may be noticed the *C. rubeculus*, Swainson, *Nat. Libr., Birds of Western Africa*, II, 181. "Wings six inches and a half long; breast and sides of the neck rufous; body beneath fulvous-white, with broad black bars; tail black, with three white spots down the shaft; the tips white. This Cuckoo is at once known from the last [*C. nigricans*, Swainson,—“Above and beneath black, glossed with blue; quills internally white, with blackish bands; tips of the lateral tail-feathers whitish; bill and legs black;”] by the colour of its tail and the greater breadth of the black bars on the body. A young specimen, in a state of moulting, has obviously been prepared by the Senegal bird-stuffers; but what we consider as the adult bird is a specimen sent, as we are informed, from India: both, however, agree in the length

Two species are confounded with it in Mr. Jerdon's elaborate catalogue of the birds of peninsular India, namely, the young of his doubtfully cited *C. flavus*, which is *C. tenuirostris* of Hardwicke and Gray, and evidently identical with *C. niger* of Latham and Gmelin, and the closely allied species which I refer to *Sonneratii*, Auctorum, both of these having been sent me by Mr. Jerdon as the adult and young of *C. Himalayanus* of his list. One of them agrees with all the preceding in having the tarse half-feathered, but the plumage of both is much more closely barred, and the tail in particular (of *C. niger* at least, for the other has this part too imperfect to judge from,) presents as many as fifteen cross-bars in the young bird, wherein this agrees with the female Cœl. There would appear to be other Indian species allied to these, which are at present very imperfectly known: and I much suspect that all will prove to have the males glossed dusky-ash of some shade, without markings except on the tail, while the females are permanently barred or spotted, in which respect they would resemble the Cœls (subgenus *Eudynamys*.)

6. *C. Sonneratii* Latham, *Ind. Orn.* II, 215; *le petit Coucou des Indes* Sonnerat, *Voy. Ind.* IV, 216; *C. Himalayanus* apud Jerdon, *Madr. Journ.* XI, 220, where *C. tenuirostris*, Hardwicke and Gray, is introduced as a synonym, the young of this being con-

of the wings and the peculiar colour and markings of the tail, so that we have but little doubt that they are of one species; although, in the young bird, the rufous colour of the breast, and the hands on the body, are not so dark as in the supposed adult from India. The vent and under-tail-coverts are light buff-colour."

It may be remarked that Mr. Swainson is one of those authors who, in general, use the term *India* in the vaguest signification, including the Burmese and Malay countries, if not all Southern Asia eastward of the Indus. Thus, to select one of many instances, he remarks, of the *Eurylaimi*, that "their geographic limits seem to be restricted to the hottest parts of India" (*Class. Birds*, II, 81); the truth being, that no species has yet been discovered in the "hottest parts of India," properly so called, but there are two on the flanks of the Himalaya, a third in Assam, and proceeding thence southward, to the east of the Bay of Bengal, the number increases in the ceded Tenasserim provinces, and attains its maximum in the Malay Peninsula and Islands; the two species first alluded to, however, not extending southward, so far as has yet been observed. Consequently, one of the distinctive features of the Ornithology of India, on the one hand, and of the Burmese and Malay countries on the other, consists in the development of this remarkable group in the latter; and the impropriety of designating the whole by the appellation *India*, is especially apparent in the case cited.

founded with the present species. (SONNERAT'S? CUCKOO.) The only objection I can perceive to the propriety of referring a specimen before me to the *Little Indian Cuckoo* of Sonnerat, is that, that author states the bill, feet, and irides of his bird to be yellow, whereas in the one here described the feet appear to have been dusky-plumbeous, with at most a tinge of yellow, and the bill is wholly black, mixed with whitish on the lower mandible. It resembles so much the female and young of the next species as to have been confounded with them by so acute a discriminator as Mr. Jerdon; but may, nevertheless, be readily distinguished from them by having the tarse half-feathered, and by the greater length and stoutness of the bill, which is also less compressed towards the tip. Probable length of the recent specimen about nine inches and a half, of wing five inches and one-eighth, and tail (the medial feathers being wanting) four inches and one-eighth; bill to forehead (through the feathers) above an inch, and to gape an inch and one-eighth; tarse three-quarters of an inch, and externally feathered nearly to the toes. Another distinction from the females and young of the next species consists in the whole underparts from the throat, being white, but very faintly tinged with fulvous on the flanks, and marked throughout with numerous narrow dusky bars, agreeing thus with the description given by M. Sonnerat; the sides of the head and neck are also white similarly barred, but the ear-coverts are coloured like the back, and the frontal feathers white at base, shewing conspicuously just over the bill; upper-parts uniformly greenish-dusky, with numerous cross-bars of rufous, excepting on the coverts of the primaries, while the latter have only an indication of these bars on the extreme edge of their outer-webs. Of the tail only two feathers exist in the specimen, which appear to belong respectively to the second and third pair; their colour is rufous, with a broad dusky bar near the end, the external webs almost wholly dusky, with traces of rufous barring on the extreme edge, more conspicuous towards the base, and fragments of numerous other bars on the inner web; its two external feathers are also seen, on turning up the rump plumage, to be growing, and what appears of them is rufous with a whitish tip, a dusky outer web and subterminal broad bar, with other narrower bars on the inner web. The body-plumage had recently been renewed, and I judge the specimen to be a mature female, and

have very little doubt that the adult male will prove to resemble much that of the next species.

Mr. Jerdon states of this bird, though it is necessary to bear in mind that he did not properly distinguish it from the following species, that "it is found, though rarely, all over the peninsula, in thick forest jungle. I have observed it once or twice only, in Malabar, and in the Coonoor Ghaut, but have seen specimens from Travancore, where it appears tolerably abundant, and also from the eastern range of ghauts, about the latitude of Madras. The stomach of the only specimen I shot contained caterpillars."

7. *C. niger*, Latham, *Gen. Hist.* III. 285*; *C. Bengalensis niger*, Brisson, IV. 141,—as cited by Latham; *C. tenuirostris*, Hardwicke and Gray,—the middle-aged female; doubtfully quoted as *C. flavus*, *honoratus*, *Sonneratii*, and *lugubris*, by Mr. Jerdon, *Madr. Journ.* XI. 220, but distinct from all of these,—the adult male. (PLAINTIVE CUCKOO.) Distinguished from the preceding by its smaller, shorter, and more curved bill, and wholly naked tarse. Length, of a male, nine inches, by thirteen inches in extent; wing four inches and a half, and tail the same, its outermost feathers an inch shorter; bill to forehead (through the feathers) barely seven-eighths of an inch, and to gape fifteen-sixteenths of an inch; tarse somewhat exceeding five-eighths of an inch. Plumage varying much in colouring according to age and sex. What I infer to be the fully mature male is described by Mr. Jerdon to have "the plumage above entirely cinereous, with a slight indication of greenish gloss on the wings only; beneath pale cinereous, vent and under tail-coverts white; the quills with a broad white band on the internal webs; and tail black, its inner webs banded with white, except the two central feathers, and all tipped white. Irides of a fine ruby red." Another is described by him to be "entirely of a dark cinereous tint, with a strong gloss of green throughout; tail blackish, edged with rufous; quills beneath cinereous. Irides blood-red: the bill blackish red beneath (at the base), also at the gape and internally; feet reddish." A third he describes as of "the same glossy green colour above, with the exception of the rump, which is a lighter cinereous without any green,

* The sole objection to this identification is, that the bill is stated to be orange.

and the forehead—which also is nearly devoid of the green ; chin and throat cinereous ; breast the same but darker, banded with rufous and white ; the belly pale cinereous, faintly marked with pale rufous and white ; under tail-coverts and tail as in the first.” One procured near Calcutta, from which the admeasurements here given were taken, agrees nearly with the last, and exactly with a specimen sent by Mr. Jerdon : irides brownish-red, the orbits dusky ; bill also dusky, with merely a dull yellowish tinge at the base of the lower mandible ; inside of the mouth carneous deeply tinged with coral ; feet olivaceous, tinged with yellow underneath. Upper-parts wholly dusky-cinereous, with a greenish gloss, except on the head and rump ; throat, breast and belly, somewhat lighter cinereous ; the vent, under tail-coverts, and greater part of the exterior webs of the outermost upper tail-coverts, white ; tail blackish, its outer feathers successively more broadly tipped with white, and the inner webs of the two outermost feathers on each side barred with the same. A specimen casting off the nestling livery has the new growing feathers of its under-parts a dull ruddy-brown colour without markings, including the belly and under tail-coverts, while those of the head and back are greenish-glossed dusky-cinereous, as in the last preceding adults. The gloss of the upper-parts of this young bird, as also the colour of the irides of the glossed Bengal specimen before described, together with the analogy of *C. micropterus*, (the second brownish plumage of which is much bronzed, while little or no trace of this exists in dark ash-coloured specimens,) indicates that the glossless uniform dark ashy examples of the present species are also in fully mature plumage, the glossed being younger birds. A specimen, which I infer to be an old female, agrees in dimensions : all the upper-parts are bright rufous, barred with broader dusky bands than in younger birds, having a greenish shine, and which are obsolete on the occiput and rump, and nearly so on the upper tail-coverts ; primaries wholly dusky-brown, with slight rufous edges towards their base only, these being more developed on the secondaries ; tail rufous, its medial feathers marked along the shaft with dusky, and the rest shewing fragments of dark bars, and a broader subterminal dusky band, with a white spot at the tip ; sides of the neck rufous, the throat, fore-neck, and breast, much stained with the same, and more or less crossed with un-

dulating dusky bars; belly, flanks, and under tail-coverts, white, with similar cross-bars more scanty on the last; some of the tibial feathers shewing traces of rufous, but otherwise white barred with dusky: the legs appear to have been dusky-yellowish. Two other presumed females agree better with General Hardwicke's figure, except that their colouring is not so rufous, but more ferruginous, and their markings generally somewhat finer: both have the entire under-parts deeply tinged with dingy ferruginous, a little albescent on the belly and lower tail-coverts; their upper tail-coverts and rump have very numerous cross-bands, as likewise the occiput; and the tail has as many as fifteen bars, the same as in the female Coël. The immature plumage of the young male before noticed, as killed while in moult, has the barring of the upper-parts of a more mottled character, the ferruginous tint paler, and the nestling feathers retained on the under-parts are banded pretty much as in the last described females; its new tail-feathers resemble those of the adult male, while the only one left of the nestling series (being the penultimate) is rufous, crossed with twelve or thirteen dusky bars.

The points of resemblance between this bird and the common large Coël (*Eudynamys orientalis*) are worthy of being noticed; viz. 1. the crimson irides,—2. the sexual diversity of plumage, which I suspect to be constant,—3. the uniform dark colouring of the male,—and 4. the nakedness of the tarse, wherein it differs from all the foregoing species; while the number of caudal bars in, at least, the younger females is a further token of this affinity, and *C. honoratus* would seem to be intermediate. Latham's description of his male *C. niger* is sufficiently accurate, except that he assigns an orange colour to the bill; but his female does not accord with any specimen which I have seen. This is described by him as having "a pale bill; is brown above, spotted with white; head striped white and brown, over the eye a white streak; under-parts white, with irregular brown spots; thigh-feathers long, barred with brown; tail cuneiform, brown, *crossed with fourteen or fifteen* whitish bars, the tip fringed with white; legs pale blue."

From what I can learn, this Cuckoo appears to be not a rare bird in Bengal, though I have hitherto succeeded in procuring but one

recent specimen* ; and Mr. Jerdon remarks that "the Plaintive Cuckoo, as it may be appropriately named, is an inhabitant of the western coast of the peninsula, being found alike in thick jungle, and in the more open spaces, and even in gardens and avenues. It occurs at all levels from that of the sea, to the top of the Neilghierries, about Coonoor and Kotagherry, where it is found in thick bushy ground. [I have been informed by this naturalist, that he has since ascertained it to be much more generally diffused than he formerly supposed.] Like the other Cuckoos it is found single or in pairs. It has a most sweet and plaintive note, which is often heard, and which sounds something like the last syllable, being *whe-whew*, *whe-whe-ē-w*, much lengthened out, and very plaintive. I found its food to consist chiefly of caterpillars."†

* I have since obtained others, among which is a female that had nearly acquired the adult garb of its sex, similar to that described above,—also two males, quite similar to each other, but in a phase of plumage different from any described in the text, and one of them incompletely moulted into this livery, retaining a few unshed secondaries and wing-coverts, together with some scattered feathers upon the nape, belonging to the first or mottled dress common to both sexes. These have the back and wings dark grey, glossed with green, the head, neck, rump, throat, and breast, pure ashy, the last being tinged with rufous, while the rest of the lower-parts, from the shoulders of the wings to the lower tail-coverts inclusive, with also the fore-part of the inner surface of the wings, and the axillaries, are uniform bright rufous-buff; irides comparatively dull red. A specimen described in the text was also moulting out of its first or mottled livery, and throwing out rufous feathers on the under-parts, but these are considerably duller than in the two now noticed, and they equally appear on the throat and breast, which in the present specimens are grey; moreover the upper-parts were coming much darker than in the latter, and equally so on the crown and back. The man who shot one of the rufous-breasted males here described, informed me that he saw it follow a butterfly on the wing, which it endeavoured to capture with its feet in the manner of a Hawk; a trial that has already been recorded of the European Cuckoo. I may add that the average size of the present species exceeds the dimensions given in the text, the males commonly measuring about nine inches and a half long, by thirteen inches and a half across; and the females nine quarter by twelve inches and three quarters.

† The Javanese *C. rufovittatus* and *C. pyrogaster* (habitat not given) of Drapiez (*Dict. Class. d'Hist. Nat., Art. Coucou*), may be varieties of this or the preceding species.

"*C. rufovittatus*. Taille, sept pouces. Parties supérieures d'un brun noirâtre, rayées de roux vif; plumes du front blanches à leur base; rémiges brunes, dentelées de roux à leur bords; rectrices largement bordées de roux, avec l'extrémité blanche, d'un roux fauve en dessous; gorge, devant et côtes du cou, et poitrine blancs, finement rayés de noirâtre; parties inférieures d'un blanc roussâtre; bec noir, brun en dessous à sa base; pieds d'un jaune rougeâtre. La femelle a fauve tout ce qui est d'un roux

8. *C. flavus*, Gmelin: *le petit Coucou de l'Isle Panay*, Sonnerat, *Voyage a la Nouvelle Guinée*, p. 122; *le petit Coucou à tête grise, et ventre jaune*, Buffon, *Hist. Nat., Ois.* VI, 382. So far as an opinion can be formed from Sonnerat's figure of this species, I incline to regard it as nearly allied to the preceding one; but the tarsi are doubtless represented much too long, and they are figured to be naked, as in *C. niger*. Length (apud Buffon) about nine inches, of which the tail measures more than half, and is of a wedge shape. Upper part of the head and throat light grey; the nape, back and wings, pale umbre-brown; belly, thighs, and lower tail-coverts, pale yellow tinged with russet; and the tail black, barred with white. Bill and feet light yellow, the former tipped with black. A female is described by Sir Stamford Raffles to have "the tail barred with brownish-yellow instead of white, and the grey extending to the breast. The nostrils are perfectly round and tubular, their edge forming a prominent ring. Found at Pulo Penang;" also in the island of Panay, and very abundant in Java, and doubtless in the Malay countries generally; frequenting the plains and cultivated tracts, where, in Java (according to Dr. Horsfield), "it is heard in the morning from almost every tall tree. It has three distinct notes, which it repeats in great regularity with a loud but not unpleasant voice, although by many natives it is considered ominous of evil."

9. *C. (Eudynamys?) honoratus*, Lin; *Cuil*, v. *Coucou tachété de Malabar*, Buffon, and figured in Shaw's *Zoology*, IX, 104: identified, according to Levaillant, with his African *Coucou Tachirou*, *Oiseaux d'Afrique*, pl. 216, apud *Dict. Class. d'Hist. Nat.*, IV, 569. This manifestly appertains to the Coël section, differing from the common Coël in being much smaller, in having a still more graduated tail, &c.: what is probably the livery of the female and young appears to be the only one described in the books to which I have access.

vif chez le mâle; elle a le sommet de la tête cendré, la gorge et les côtés du cou teints de fauve, et toutes les parties inférieures rayées de noirâtre. De Java.

"*C. pyrogaster*, Vieillot. Taille huit pouces, six lignes. Parties supérieures d'un brun bronzé, rayées transversalement de fauve; sommet de la tête tirant sur le cendré; rémiges intermédiaires dentelées de fauve, les latérales de blanc; toutes étagées et terminées de blanc; gorge, dessous du cou, poitrine et ventre d'un fauve pâle, rayés transversalement de brun et de blanc; bec noir, brunâtre à sa base en dessous; pieds rougeâtres."

Length above a foot, the tail about six inches, and very much graduated, its outermost feathers scarcely more than half the length of the middle ones. All the upper-parts blackish-ash, marked with two points of white on each feather; the throat and under-parts white, with ash-coloured cross-rays; quills cinereous, and also marked with transverse macular bars. This bird is stated to inhabit Malabar, but much requires to be verified as an inhabitant of India. It is apparently intermediate to the common large Coël and diminutive *C. niger*.

10. *C. (Eudinamys, Vigors and Horsfield, Lin. Trans. XV, 304,) orientalis, Lin.; C. Indicus, Latham, Ind. Orn. III, 285; and the female—C. Mindanensis, scolopaceus, crassirostris, punctatus, and maculatus, Auctorum. (COMMON COËL.)* Length fifteen and a half to sixteen inches, by twenty-three inches in extent; wing seven inches and a half, and tail the same; bill an inch and a quarter to forehead (through the feathers), and nearly one and a half to gape; the tips of the mandibles opening to two inches and a quarter from the hooked extremity of the upper one; tarse an inch one-eighth, and bare of feathers except close to the joint: irides bright crimson, affording a very conspicuous character in the living bird, and quite relieving the sombre uniform greenish-glossed black colour of the plumage of the mature male: bill pale greenish, and inside of the mouth flesh-coloured: legs somewhat bluish-slaty, or in younger individuals dull greenish lead-colour. Average size of both sexes alike, or nearly so, though it may be that the females are more commonly somewhat the larger. Too well known in India to require a further description. This bird is very common in Bengal, as also in the Malay countries, extending even to Australia (*Lin. Trans. XV, 304*), where, however, it is understood to be rare.* Mr. Jerdon notices it as “common in the Carnatic in groves, gardens and avenues, and also on the west coast; but rare on the bare table-land. It feeds entirely on fruit, and is remarkably fond of the fig of the banyan tree.” During the time these figs are ripe, which is early in the cold season in Bengal, the trees are quite alive with Barbets (*Bucco*), Coëls, and other less abundant visitants. Col. Sykes remarks, of the Coël, that “its sin-

* The *Cuc. crassirostris*, currently identified with this species, is described as African.

gularly loud notes are not at all like those of a Cuckoo" (*P. Z. S.* 1832, 97): assuredly they do not resemble that "note of fear, unpleasing" to particular parties, but those who are acquainted with the melodious liquid shaking note which the European Cuckoo frequently utters as it takes wing, will immediately recognise the Coël's cry as thoroughly *cuculine*; at least I did so, before I knew what bird it proceeded from. The Coël is very commonly kept caged by the native inhabitants of Calcutta, becoming quite fearless and familiar, and frequently uttering its loud cry (*koyo-koyo-koyo*, with variations,) adverted to by Col. Sykes, as well as another note, which truly corresponds to the sound *cuckoo* emitted by the bird of Europe, and which sounds like *ho-whee-yo*, delivered at intervals as the *C. canorus* utters its well-known cry, often for a long while together, and not unfrequently in moonlight nights. The Coël is remarked by Mr. Jerdon to be parasitic,* and here as with him usually selects the nest of the common Indian Crow (*Corvus splendens*) to deposit its egg (or, as I am told, generally two eggs) in; and I am further assured, that it is no unfrequent occurrence for the Crow to turn out the young Coël at the age when it has begun to put forth its spotted feathers. This remains to be certified by further observation. The Coël is very good eating; and the same is stated of the European Cuckoo. As compared with the allied species, its robustness of form would seem to be exceptional, rather than normally characteristic of its subgenus, and its relation to some of them may be compared to that of *Gracula* (or *Eulabes*, Cuv.), *religiosa* to *Pastor tristis* and the other thick-built smaller Mynahs.

I shall not venture to introduce, as an established species, different from the Coël, the *C. Panayus*, Latham, *Ind. Orn.* I., 210, *Gen. Hist.*, III., 281,—founded on the *Coucou tacheté de Panay* of Sonnerat: which appears to differ only from the female *orientalis* in wanting the rufous on the ear-coverts (not always present in the young of the latter), and in having an ungraduated tail: the throat and upper part of the front of the neck are also figured and described as black, spotted like the back, and abruptly defined. It is said to inhabit the island of Panay, but needs verification.

* Vide also *J. A. S.* VIII. 684.

Subgenus *Pseudornis*, Hodgson, *J. A. S.* VIII. 136.* (DRONGO CUCKOOS.) Essential structure that of the other Cuckoos with feathered tarsi, but the tail even or forked, except that the outermost feathers are much shorter than the rest, and the two lateral halves of the tail curve outwards towards the extremity, as in the Drongos. The size, colouring, and general aspect, also, so closely resemble those of the Drongos (*Edolius*, subgenus *Dicrurus*), that an ordinary observer might readily mistake one for the other, whence Mr. Hodgson's apt designation of *false bird* (*Pseudornis*), i. e. 'disguised Cuckoo.' Mr. Jerdon, indeed, suggests, of one of them,—“Does this Drongo Cuckoo select the nest of the *Dicrurus* to deposit its eggs in? If so, the foster-parents would hardly be undeceived even when their progeny were arrived at maturity.” The sexes are similar, but whether the young also resemble the adults I am unaware. These birds inhabit upland forests.

11. *C. (Pseudornis) dicruroides*, Hodgson, *J. A. S.* VIII. 136—*Mad. Journ.* XI., 221. (FORK-TAILED DRONGO CUCKOO.) Length ten inches to ten and a half, of wing five and a quarter to five and a half inches, and of penultimate tail-feathers five inches and a half to five and three-quarters, the outermost an inch and a quarter less, and the medial three-eighths of to half an inch less than the penultimate; bill to forehead (through the feathers) an inch, and to gape rather more; tarse three-quarters of an inch. Irides hoary-brown; bill black, the palate red; legs and feet blue. Colour black, with a changeable blue and green gloss, brighter on the upper-parts: head subcrested: the outer webs of some of the long tibial feathers white, as also those on the tarse, and the under tibial feathers which are of downy texture; a minute speck of this also near the tips of the outer principal wing-coverts, but often obsolete; the same occasionally on the tips of the upper tail-coverts, and a series of such on the lower tail-coverts; the outermost tail-feather obliquely barred with white, the bars in some contracted into spots, and finally an oblique streak of white on the inner surface of the wing, and a round spot of it on the inner web of the short outermost primary.

*Erroneously identified with *Oxylophus*, Swainson, by Mr. G. R. Gray, *List of the Genera of Birds*, &c. 1st edit. p. 57.

In Nepál, according to Mr. Hodgson, this species is confined exclusively to the mountain forests; and I am informed that it occurs rarely at Darjeeling. A single specimen has been obtained by Mr. Jerdon in Southern India, near Manantoddy, in the Wynaad; in this individual the irides are stated by him to have been reddish-brown, and the legs reddish.

12. *C. (Pseudornis) lugubris*, Horsfield, *Lin. Trans.* XIII. 179, and *Jav. Res.*, with a coloured figure; *C. albopunctulatus*, Drapiez, *Dict. Class. d'Hist. Nat.* IV, 570. (SQUARE-TAILED DRONGO CUCKOO.) This so very much resembles the last as to require some consideration as to the propriety of admitting them as distinct; but on minute comparison I am satisfied that they are distinct, although the plumage absolutely resembles, to every white speck and marking on the greenish-glossed black ground; the example of *C. lugubris* before me has, however, an occipital spot composed of three or four wholly white feathers, which I do not perceive in the preceding species, though both specimens of the latter which I have for comparison are unfortunately somewhat defective of feathers just at that part; there are also a few scattered white specks upon the crown and on the breast of *C. lugubris*, which however may occur in some specimens of the other: the more distinctive differences consist in the present being a smaller bird, with shorter wings and tail, the latter square, or merely exhibiting a furcate tendency from the decided curvature outward of each lateral half, besides which the outermost pair of tail-feathers are in a greater degree shorter than the rest than in *C. aicruroides*. Length about nine inches, of wing four inches and seven-eighths, and tail four inches and a half, its outermost feathers an inch and a half shorter than the rest, whereas in *C. dicruroides* these are but an inch and a quarter shorter than the more elongated penultimate tail-feathers; bill to forehead (through the feathers) fifteen-sixteenths of an inch, and to gape an inch; tarse under five-eighths of an inch. Bill and feet black, according to Dr. Horsfield, but the latter seem to have had a yellowish tinge in the Society's specimen: irides, according to the same authority, dark-coloured.

"The *C. lugubris*," writes Dr. Horsfield, "is found in districts of secondary elevation, which are diversified with extended ranges of hills and covered with luxuriant forests. The southern and wes-

tern parts of Java are generally of this description. In the extensive central plains intervening between abrupt, conical, and elevated mountains, and which are generally in a high state of culture and covered with flourishing towns and villages, I have rarely observed it. This bird retires into the deepest coverts, and having a dark plumage, it is with difficulty surprised. Its peculiarities, both as to voice and habits, have not, as far as known to me, been observed. Its habits are very different from those of *C. (Eudynamys) orientalis* and the *C. flavus*, both of which are very abundant in Java." The specimen here described was brought from Singapore.

Subgenus *Chrysococcyx*, Boié (1826), v. *Lampromorpha*, Vigors, v. *Chalcites*, Swainson. (METALLINE CUCKOOS.) The members of this group absolutely resemble the first or typical Cuckoos in structure, being merely characterized, in addition to their very small size, by the resplendent metallic hues of their plumage.

At least three inhabit the Malay countries, two of which are described by Dr. Horsfield in *Lin. Trans.* XIII., 179, and one of them more elaborately in his 'Zoological Researches in Java'; besides which the next appears to be not uncommon in the Malay peninsula, if not also in the Tenasserim provinces.

13. *C. lucidus*, Gmelin; *C. Malayanus*, Raffles, *Lin. Trans.* XIII. 286,—the female; *C. metallicus*, Vigors, *Ibid.* XV. 303,—the young, as satisfactorily shewn by specimens in transitional plumage. (BANDED EMERALD CUCKOO.) What are evidently the male, female, and young, of a species which appears to be referable to the foregoing, are clearly identical with one another, the intervention of the female livery assisting to demonstrate the necessity of bringing the above synonyms together. Length of a splendid male fully seven inches, of wing four inches and a quarter, and tail three inches, its outermost feathers half an inch shorter; of bill to forehead (through the feathers) five-eighths of an inch, and tarse half an inch. Bill, in the dry specimen, translucent pale straw-yellow, both mandibles tipped with dusky. All the upper-parts, with the breast, brilliant dark emerald-green, the feathers silky in texture, and having a rich and slightly aureous silken gloss; belly, sides, and under tail-coverts, with the inside of the wings anteriorly, white, transversely barred with shining green; tail like the back, a pair of unmoulted old feathers, next to the uropy-

gials or central pair, of a duller or more bronzed green, with dusky tip and slight rufous edge, and one of the outermost pair, also unmoulted, having a pale tip and deep rufous barrings, but the corresponding outermost feather on the other side, which has been moulted, having smaller bars of white, almost confined to the outer web; rest of the tail streakless, and equally bright on both webs as the uropygials, the penultimate feather only being slightly tipped with white; such of the large wing-feathers, also, as have been renewed, are bright-green like those of the back, the old being dusky with merely a faint gloss of green, and the old coverts a more bronzed green, slightly tipped with rufous. A presumed old female is smaller, or barely six inches and a half long; wing from bend four inches and one-eighth, and tail two inches and three-quarters: dusky tips of the mandibles rather more developed than in the male: this specimen also is moulting, and the new feathers of its wings and tail resemble those of the other sex; but the rest of the upper-parts are much more bronzed, especially on the head and neck, and the feathers of the crown have each a well defined narrow whitish bar; throat, front of neck, and breast, also bronzed shining green, with white cross-bars; and rest of the under-parts resembling those of the male, but the transverse green markings more bronzed. Three specimens of the young differ from the young of the subgenerically restricted Cuckoos in having no transverse bars on the upper parts: crown, nape, and interscapularies, a rather faintly bronzed dull-brown, the last also more or less of a shining green, which prevails on the scapularies, tertiaries, and on the wing and tail-coverts; under-parts whitish, barred throughout with faintly bronzed brown; primaries and secondaries, with the coverts of the former, and the winglet, dull brown, the primaries marked at the basal half of their inner webs underneath with white, as is also the case in the adults; tail brown, with a faint green gloss and subterminal dusky band, all but the uropygials having a white spot at the tip of their inner webs, and the outermost feathers having both webs barred with white, and more of this than in the adult, and the rest with two or three rufescent bars on the inner web only: bill wholly dusky.

The *C. lucidus* was originally discovered in New Zealand, and is also known as an inhabitant of Australia, from which continent the specimen described as *C. metallicus* was obtained. The *C. Malayanus*

of Sir Stamford Raffles, is mentioned as a "native of the Malay peninsula"; and the specimens here described are from that country and (I believe) Tenasserim.

14. *C. chalcites*, Temminck, *Pl. Col.* CII, fig. 2; *C. basalis*, Horsfield, *Lin. Trans.* XIII., 179. I copy the following description from Shaw's Zoology, XIV., 209. "Length rather more than five inches and half [six inches, Horsfield], the male having the top of the head red, with a bronzed gloss; the back and wings plain metallic green, the tail above red at its base, a little shaded with green in the middle, and white at its tips, the two lateral feathers having large oval white spots on their inner webs: the fore-part of the neck and the breast are whitish, varied with brown; the belly is white; the under tail-coverts whitish spotted with bronzed green; the tarse long and naked [?]. The female is reddish above, very slightly shaded with bronze, and white beneath."

From analogy I should judge that the female and young, rather than the mature male and female, are here described. This species inhabits Java and Australia. The identity of *C. basalis* and *C. chalcites* is stated by Dr. Horsfield in the 'General Catalogue of Javanese Birds,' prefixed to his Zoological Researches in Java, where also we are informed that *C. pravata*, Horsf., briefly described in *Lin. Trans.* XIII., 179, is "to be cancelled."

15. *C. xanthorhynchos*, Horsfield, *Lin. Trans.* XIII, 179,—*Jav. Res.*, with a coloured figure. (AMETHYSTINE CUCKOO.) Length six inches and half, of wing four inches, and tail three inches, its outermost feather half an inch shorter; bill to forehead (through the feathers eleven-sixteenths of an inch, and tarse half an inch. Colour of the upper-parts and breast brilliant amethystine-violet, with dull dark margins to the body-feathers slightly glossed with green; beneath white, barred across with dark green; outermost caudal feathers having five white bars, the last terminal, and the two basal not extending to the inner web; the next two feathers on each side are tipped with white, and the penultimate have rudiments of other white bars; rest of the same splendid colour as the back: bill wholly yellow, and much less thick than represented in Dr. Horsfield's plate; and feet apparently dusky: the crown is very slightly crested. Inhabits Java, where stated to be rare and very shy. Dr. Helfer mentions its existence, also, in the

Tenasserim provinces, and it is probable that the Asiatic Society's specimen was thence obtained.

Subgenus *Oxylophus*, Swainson. (CRESTED CUCKOOS.) These have bare tarsi, and the occipital feathers lengthened to form a considerable crest: the wings shorter and less pointed than in the preceding, having the fourth primary (instead of the third) more or less the longest: they are never barred or mottled at any age; and are mostly green-glossed black above, and whitish beneath, sometimes varied with other colours. I know of nothing peculiar in their habits.

16. *C. Coromandus*, Auctorum. I can hardly reconcile the conflicting descriptions of this species without some suspicion that two have been confounded under the name. That with which I am acquainted, as occurring in Bengal, Nepál, Tenasserim, and which is also the *C. Coromandus* of Mr. Jerdon's list (*Madr. Journ.* XI, 222), is well described by Latham, *Gen. Hist.* III, 292, and may be distinctively termed the RED-WINGED CRESTED CUCKOO. A male I procured measured fourteen inches and a half long, by eighteen inches and a half in spread of wing; the latter from bend six inches and three-eighths, and middle tail-feathers eight inches and a half, the outermost four inches and a half shorter; but the tail is generally somewhat longer than this, its middle feathers not uncommonly measuring ten inches and a half; bill to forehead (through the feathers) an inch one-eighth, and to gape an inch and a quarter; tarse an inch, being a little feathered towards the knee. Irides dark hazel: orbits dusky; bill black; the inside of the mouth dull coral-red; feet lead-coloured. Upper-parts, comprising the scapularies and tertiaries, with the tail, black glossed with green, paler on the tertiaries, and less glossed on the head; the longest occipital feathers exceeding an inch and a half: a conspicuous half collar of white encircles the nape: wings invariably deep ferruginous, the tips of the primaries and secondaries dusky: under-parts white, a little tinged with fulvous, excepting the lower tail-coverts which are green-black, and the throat and fore-neck, which in some are deep ochreous-fulvous, in others (probably females) a very light fulvous, deepening laterally. The wings of the presumed females are scarcely less deep in colour than in the males.

Dr. Latham remarks, that "the above is found not only on the coast of Coromandel, but also on the south coast of Africa, where

M. Levaillant met with it, near the rivers Swarte-kop and Sondag. Many also have been brought from Senegal." In the vicinity of Calcutta it is certainly rare, as the specimen above noticed was the only recent one ever seen by the Society's taxidermists, who were unaware of its existence in this part; and it does not appear to be commoner in peninsular India, but on the eastern side of the Bay of Bengal it is more numerous, as likewise, I have reason to suspect, in Nepâl. With its note I am wholly unacquainted.

The definition by Linnæus of *C. Coromandus* is merely "*caudâ cuneiformi, corpore nigro, subtus albô, torque candidô*"; saying nothing of the very conspicuous character of the rufous wings, nor of the hardly less conspicuous fulvous throat of especially the male: various other authors assign a small, round, grey spot on each side of the head behind the eye, no trace of which is perceptible in six specimens before me; and likewise assert, that the throat as well as the thighs are blackish, the latter only being more or less dusky in the specimens I have seen. Analogy with *C. edolius* renders it probable, however, that the young are here adverted to.

The *Ceylon Cuckoo* of Latham (*Gen. Hist.* III, 291,) must be nearly allied. Length seventeen inches. Bill curved, black; general colour above, and of the tail, fine blue black; the head much crested; chin and throat dull yellow-ochre; from this the rest of the under-parts are white; thighs pale ash-colour; tail cuneiform, blue-black; its two middle feathers nine inches long, the others gradually much shorter; legs blue, the hind claws curved, neither of them straight nor subulated. Inhabits Ceylon. Mr. S. Daniell."

17. *C. edolius*, Cuvier; *C. ater* and *melanoleucos*, Gmelin,—*ser-ratus*, Sparrman; *le Coucou Edolio*, Levaillant; *Le Jacobin huppé de Coromandel*, Buffon. (PIED CRESTED CUCKOO.) Length thirteen inches, by seventeen inches and a half in extent of wings; the latter from bend five inches and three-quarters; and middle tail-feathers seven inches, the outermost three inches less: bill to forehead (through the feathers) an inch and one-eighth, and to gape a trifle more; tarse fifteen-sixteenths of an inch. Irides dark-coloured; bill black; and legs bluish-leadен. Colour of the upper-parts uniform black, not very intense, with a greenish shine, except the bases of the primaries which are pure white, forming a conspicuous wing-spot: all the tail-feathers,

except the middle pair, rather largely tipped with dull white: crest-feathers an inch in length: under-parts dull white, or faintly tinged with fulvescent, more especially in the female, which presents no other difference of plumage from the male. A full-grown young bird measured twelve inches and a half long, by sixteen inches and a half across: upper mandible of the bill dusky, with a slight yellowish tinge; the sides of its base, and nearly all the lower mandible, bright-yellow: irides dark hazel, with greenish-yellow orbits: feet greenish lead-colour. Upper plumage as in the adult, but much less deeply coloured, and the coronal feathers scarcely elongated, and rounded like the dorsal plumage at their tips; the throat ashy, passing downward on each side, and separated by a whitish streak from the dark ear-coverts; the rest of the under-parts, and tips of the tail-feathers, rather deeply tinged with fulvous, as also the greater portion of the wing-spot; coverts of the primaries slightly tipped with fulvous-white.

This is a common Bengalee species, and appears to be found also in South Africa, where, however, it must not be confounded with the *Oxylophus Levillantii* of Swainson's 'Illustrations' (2nd series, Vol. I, pl. XIII), the *Variété de Coucou Edolio* of Levillant, or *C. Afer* of Leach and Shaw, which is nearly allied, but larger, and at once distinguished by the sagittal black spots on its throat and fore-neck. The present species was strangely referred to *Leptosomus Afer* by Major Franklin and Colonel Sykes; and Mr. Jerdon remarks of it — "The *Popeya* is distributed all over India, but cannot be said to be a common bird anywhere [here, in Bengal, it certainly is tolerably common]. It is of course most numerous in the more wooded districts. I have seen it in the Carnatic, Malabar Coast, and even on the bare Deccan, in low jungle or among gardens. It hunts single or in pairs, and feeds chiefly on various soft insects, &c. On the Neilgherries, I have seen it occasionally about the edges of the hills, frequenting the thick bushy ground there." From what I have observed of this species, it is not one which much affects concealment, but frequently sits exposed on a dead or bare branch. I have never heard from it any note resembling the sound *Popeya*, which is here also the common name of the species; but only a continuously reiterated simple cry, by no means loud. It is also designated *Koloo Bulbul*, allusive probably to its crest; for native classification is not better than popular classification in England,

where the *Accentor modularis*, for example, is styled 'Hedge Sparrow.' Dr. Latham informs us, that it is said to lay its eggs in the nest of the Chatterbox (*Malacocercus Chataræa*), and that they are plain greenish in colour; the Cuckoo said generally to destroy those of the Thrush, when it deposits its own": this at least is true of the European Cuckoo (*C. canorus*), whence any eggs that may be found in the same nest with the Cuckoo's egg, have been laid subsequently to the introduction of the latter. The *C. Vaillantii* before noticed, according to Latham, inhabits India, a figure of it being among the drawings of Gen. Hardwicke; but I greatly suspect there must be some mistake in this.

In the Pied Crested Cuckoo, it may be remarked that the third primary is very nearly equal to the fourth, and exceeds the fifth; whereas in the Red-winged species (*Coromandus*), the third is considerably shorter than the fifth. With the Crested Cuckoos terminates the genus *Cuculus*, in its most extended signification, agreeable to modern notions of arrangement; and I next pass to the consideration of the Malkohas (*Phœnicophæus*), an extensive group generally characterized by having a somewhat large, green-coloured bill, having the nostrils basal, and placed near the edge of the upper mandible,—a coloured bare space round the eye, more or less developed,—distinct eye-lashes, in general, but rudimental only in the subgenus *Rhinortha*,—a longer tarse than in the Cuckoos, but the toes similarly formed for arboreal habits,—short and rounded wings, of which the sixth primary is usually longest, the fifth, sixth, and seventh being nearly equal—and a broad and much graduated tail, sometimes of great length.

Among them, the most distinct subgenus is that of

Rhinortha, Vigors, (1830), v. *Anadænus*, Swainson, (1837): STRAIGHT-BILLED MALKOHAS:—wherein the clothing plumage has disunited webs, and the bill is straight, tapering regularly to the end, where the tip of the upper mandible curves somewhat abruptly to overhang that of the lower one. The size of these birds is inferior to that of most of the others; and I am not aware that any occur to the westward of the Bay of Bengal.

18. *Rh. rufescens* (?); *Anadænus rufescens* (?), Swainson, mentioned in *Class. Birds*, II., 324; *Phœnicophæus viridirostris*, Eyton,

P. Z. S. 1839, p. 105; *Bubutus Isidorei*, Lesson, figured in one of the plates to Bellinger's Voyage, as I am informed by Mr. Jerdon. Length twelve inches and a half, of wing four inches and a half, and middle tail-feathers seven inches, the outermost three inches and a half less; bill to forehead an inch and one-eighth, and to gape an inch and three-eighths; tarse fifteen-sixteenths of an inch. Colour of the upper-parts bright rufous-chestnut, except the head and neck which are pure light grey, together with the breast; the rest of the lower parts tinged with ferruginous, the flanks and lower tail-coverts coloured as above; volar feathers of the wings tipped with dusky, more developed on the primaries, and all the tail feathers tipped with white and subterminally with black; the legs appear to have been bluish. I am unaware whence the Society's specimen of this bird was obtained, but the species is included in Mr. Eyton's catalogue of a collection of birds from the Malay Peninsula, under the denomination cited.*

19. *Rh. chlorophæa*: *Cuculus chlorophæus*, Raffles, *Lin. Trans.* XIII, pt. II, p. 228; probably cited as *C. chlorocephalus*, Raffles, *P. Z. S.* 1839, 105; *Coccyzus badius*, J. E. Gray, and *Anadænus rufus*, Swainson, apud G. R. Gray (*List of the Genera of Birds*, first edit., p. 56). Length, of the largest specimen before me, thirteen inches and a half, of wing four inches and a half, and middle tail-feathers seven inches, the outermost three inches and three-quarters less; bill to forehead an inch and three-sixteenths, and to gape an inch and three-eighths; and tarse an inch. Colour of the upper-parts bright rufous-chestnut, as in the preceding species, and the volar feathers of the wings similarly tipped with dusky; but the head, neck and breast, are bright ferruginous, paler on the throat, the belly tinged with fuscous, and under tail-coverts blackish: tail and its upper coverts wholly dusky-black, the former tipped with white, and both crossed with numerous rays of a paler colour. The legs, according to Raffles, are bluish; and the naked space round the eyes of the

* The *Cuculus melanogaster*, Vieillot, *Dict. Class. d'Hist. Nat.* IV, 570, would seem to be allied. "Taille, quinze-pouces. Parties supérieures ferrugineuses; sommet de la tête cendré; rectrices longues, etagées, noires et terminées de blanc; gorge, devant du cou, et poitrine, roussâtres; parties inférieures noires: de Java." The plumage would thus appear to be intermediate to that of *Rh. rufescens* (?) and of *Rh. chlorophæa*.

same green colour as the bill, which is doubtless also the case with the preceding species. This bird, observes Sir Stamford Raffles, "inhabits the forests of Sumatra, but is not common. It feeds on insects, like the rest of the genus." The Society's specimens are from Singapore.

The more restricted Malkohas have been divided by Mr. Swainson into *Phœnicophæus* and *Dasylophus*.

Dasylophus is defined by him to have the "bill rather large, compressed in its whole length. Gonyes angulated. Culmen convex, gradually arched. Frontal feathers incumbent, and concealing the nostrils. Feathers before the eye erect, forming a double crest."

20. *Ph. superciliosus*, Cuvier. (RED-EYEBROWED MALKOHA). Two specimens in the Society's Museum may, I believe, be referred to this species, though but partially agreeing with the description in the *Dictionnaire Classique*, which is the only one to which I have access. Length about sixteen inches, of which the middle tail-feathers measure eight inches and a half, the outermost being three inches and a half less; wing six inches; bill to forehead (in a straight line) an inch and five-sixteenths, and to gape an inch and three-quarters; tarse an inch and three-eighths. General colour dusky, brightly glossed on the upper-parts with greenish-blue, the tail-feathers white-tipped; the bare orbital skin not papillose, bounded above to beyond the eye with a white streak, and fringed above throughout its length with a singular erect range of rigid and glistening, narrow and discomposed, red feathers, the longest nearly an inch in length; bill apparently yellow at base, then shewing a sinuous deep green zone, and the rest pale green; in form more evenly compressed throughout its length than in the subgenerically restricted *Phœnicophæi*. A young bird is generally similar but less brightly glossed, the posterior portion of the red eyebrows much less developed, and the anterior portion yellowish in colour. The *Malkoha á sourcils rouges* described by M. Drapiez as *Ph. superciliosus*, Cuv., however, is stated to be but from ten to eleven inches (French) in length, having the under-parts of a dull white, but agreeing in all other respects. Should that here described prove different, it might be termed *Ph. ornatus*. M. Drapiez's bird is stated to inhabit the Philippines.

21. *Ph. Cumingi*, Fraser, P. Z. S., 1839, p. 112. (LAMINATED MALKOHA.) Length sixteen inches and a half, of wing six inches, tail

eight inches, bill an inch and a half, and tarse an inch and a quarter. This is at once distinguished from all other known species of *Cuculidæ*, "by the singular structure of the feathers of its crest and throat, the shafts of these being expanded at their extremities into laminae, which may be compared to the shavings of whalebone; and in this respect they resemble the crest feathers of the Toucan to which Mr. Gould, in his Monograph, applies the name *Pteroglossus ulocomus*, but which is the *Ph. Beauharnesii* of Wagler, only they are not curled as in that species. The feathers above the nostrils, of the crest and chin, and along the middle of the throat, are grey at the base, have a decided white spot towards the middle, and are terminated by a broad expansion of the shaft, which is of a glossy black colour, and exhibits blue or greenish reflections; the external edge of this expanded portion of the shaft is minutely pectinated: the occiput and sides of the head are grey, passing into dirty-white on the cheeks and sides of the throat: the hinder part and sides of the neck, with the breast, are of a deep chestnut colour: the back, wings and tail, deep shining green: all the tail-feathers are broadly tipped with white: the vent, thighs, and under tail-coverts are dusky-brown, tinged with green: the bill is of a brown colour, and the feet are olive: irides red."

This beautiful species was obtained in the Island of Luçon, of the Philippines, being termed *Ansic En Bicol* in the language of Albay. It is referred by Mr. Fraser to the present subgenus, though apparently devoid of the last character assigned to this by Mr. Swainson; and it would also seem, from the description, to want the usual naked space surrounding the eyes.

The subgenus *Phœnicophæus* is restricted by Mr. Swainson to such as have the "bill large, very thick, smooth, resembling that of a Toucan in miniature [the nostrils, however, very differently placed]. Face naked [and papillose]. Nostrils basal, oval, close to the rictus; placed in a groove of the bill [not always perceptible], and defended by stiff erect bristles." Ridge of the bill more or less convex, in some obtusely angulated; its terminal half more compressed than the basal half.

Among these, Cuvier distinguishes, as having the nasal apertures narrow and placed near the edge of the bill:—

22. *Ph. pyrrhocephalus*; *Cuculus pyrrhocephalus*, Gmelin; *Ph. leucogaster*, Dumeril. (WHITE-BELLIED MALKOHA.) I quote the following description from Latham. "The length of this bird is sixteen inches; weight four oz. Bill strong, very thick at the base, and bending downward; its colour greenish-yellow: top and hind-part of the head and neck, under the jaws, greenish-black, with a slender white streak down the shafts of the feathers, appearing, from the narrowness of those about the head, as numerous specks: sides of the head, and round the eyes, wholly bare of feathers, appearing rough or granulated, and of a reddish-orange colour [crimson in the living bird?], bounded beneath with white: the middle of the crown feathered: fore-part of the neck, back, and wings, greenish-black, with a gloss of green on the last: tail very long, cuneiform, greenish-black, appearing glossy in some lights, the feathers white for nearly one-third from the end: breast and belly white: the legs brown, with yellowish scales: wings reaching a little beyond the middle of the tail [an extraordinary elongation in this genus, and perhaps owing to the manner in which the skin described had been prepared]. Inhabits Ceylon, where it is called *Malkoha*. A specimen, in Mr. Daniell's drawings, was fully eighteen inches long, and named *Maal-Kenda-Ettah*." Also said to inhabit Africa.

Others have round nostrils placed basally.

23. *Ph. viridis*, Lavaillant: *le Rouverdin*, Id.; *Ph. curvirostris*, Shaw, *Nat. Misc.* pl. 905; *Ph. tricolor*, Id., *Zool.* IX, 61; *Ph. melanognathus*, Horsfield, *Lin. Trans.* XIII, pt. I, p. 178, and *Cuculus melanognathus*, Raffles, *Ibid.* pt. II, p. 287. (RED-BREASTED MALKOHA.) About eighteen inches long, of which the middle tail-feathers measure ten inches and a half, and the outermost four inches and a half less; wing six inches and a half; bill to forehead (in a straight line) an inch and a half, and an inch and three-quarters to gape; tarse an inch and a half. The bare skin around the eye less developed than in the last species, but still large and extending forward to the bill, being of a bright red colour in the living bird; the irides dark; and feet lead-coloured. Back and wings dark and glossy bluish-green, continued along the rump and two-thirds of the tail in one specimen before me, while in another the entire central pair of tail-feathers is of this hue, and there is more of it on the rest

of the tail-feathers than in the other; head dark ashy, as also the chin and feathers bordering the lower part of the orbital skin in the second specimen above mentioned; the rest of the under-parts deep chestnut-rufous, more or less paler on the throat, and darkening to maronne on the belly and lower tail-coverts: in the first specimen mentioned, the outermost tail-feathers are almost wholly maronne, and the rest successively more so to the middle pair, which have only their terminal third of that colour: bill glaucous-green, the basal half of the lower mandible coral-red towards the middle.

Sir Stamford Raffles states that this bird "feeds on insects, and not, as has been reported, on fruits. It is found on the hills of Sumatra and the neighbouring [peninsula and] islands, but is not easily procured, as it commonly perches on the summits of the highest trees." It is described also to inhabit Africa.

24. *Ph. tristis*: *Melias tristis*, Lesson; *Cuculus Sumatranus*, Raffles, *Lin. Trans.* XIII, pt. 2, p. 287. (LITTLE MALKOHA.) Length of a fine specimen fifteen inches, of which the tail is nine inches, its outermost feathers four inches and a quarter less; wing five inches; bill to forehead (in a straight line) an inch and one-sixteenth, and an inch and three-eighths to gape; tarse an inch and one-eighth. Entire upper-parts closely resembling those of the preceding species (*Ph. viridis*), except that the tail-feathers are wholly greenish and white-tipped: under-parts of a dark ash-colour: orbital skin tolerably large, and bordered above with a slight streak of white: some have a tinge of rufous about the breast. Inhabits Sumatra and the adjacent peninsula and islands, where it lives (according to Raffles) upon insects; and it was also obtained by Dr. McClelland in Assam.

In *Ph. tristis*, the bill is more compressed than in *Ph. viridis*, and the ridge of the upper mandible is obtusely angulated throughout, instead of being quite rounded and bulged towards the base, as in that species; the inferior margin of the upper mandible also curves much further downward, overlapping the base of the lower mandible. In the next two species, the bill is still more compressed and proportionally smaller, assuming nearly the same form as in *Xanclostomus*, wherein Mr. Jerdon has even placed one of them. It is possible that either the *Tacocua* of Lesson, or the *Calobates* of Temminck, may refer to this form.

Notes, principally Geological, on the Tract between Bellary and Bijapore.

By Capt. NEWBOLD, F. R. S. &c. Madras Army.

No. 1.

The notes, of which the following paper is an abstract, were taken during a survey ordered by Government of that line of Post Road, connecting Bombay and Madras, which lies between Bellary and the ancient Mahomedan capital Bijapore. They commence from Bellary, comprising a line of 164 miles extending in a north-westerly direction through part of the Ceded Districts, the Nizam's dominions, and the Southern Mahratta country, crossing at right angles the courses of the Tumbuddra and Kistnah rivers as they hasten across the Peninsula from west to east, to add their tribute to the Indian ocean. The route chiefly lay over a vast undulating plain, constituting a considerable portion of the great plateau that is elevated on the shoulders of the Eastern and Western Ghats, and intersected by a few subordinate spurs, running nearly at right angles with the great lines of dislocation.

From Bellary to Courtney, a distance of eleven miles, extends a plain based on granite and gneiss, penetrated by numerous greenstone dykes. From Courtney to Yailbenchi, four miles, the plain continues, as before, covered with a superstratum of *règur*, or the black cotton soil of India, to a depth of from one to eighteen feet, in many places resting immediately on the gneiss and granite; in others on an intervening bed of a calcareous deposit, somewhat resembling the travertin of Italy, though more nodular, and called by the natives *kanker*. It is burnt by them for lime. Like rows of flints in chalk, it is seen also in the lower layers of the *règur*, often with sharp projecting spiculæ of carb. of lime, which would have been broken off had the nodules been drift pebbles. Here and there, on the surface, and partly imbedded in the soil, greenstone occurs *en boules*, indicative generally of a subjacent dyke. Angular fragments of both yellowish and reddish quartz in many places literally strew the surface of the ground, which close to Yailbenchi, changes to a red clayey soil; and, on examination, proved to be the result of the disintegration of a bed of micaceous hornblende schist, with gneiss here rising to the surface. Granite, greenstone, and a rock composed principally of a reddish foliated felspar, pierced by veins of the same mineral in a more compact form,

and tinged of a delicate green by actynolite, are seen in the walls of the small fort here. The produce of the soil is principally cotton, and juari, (*Holcus sorghum*).

From Yailbenchi to Devasamudrum, the *règur* continues covering the surface of the plain, mingled, in greater or less proportion, with the angular debris of the subjacent rocks just alluded to; except near the village of Soganhully, where it is interrupted by a bed of a rich red alluvial soil, deposited apparently in this low situation by a number of rivulets flowing easterly from the great tank, or artificial lake of Daroji. This rich soil deriving additional fertility from the water to which it owes its locality, produces rice and wheat in addition to other grain; and also sugar cane. In some places, however, it is impregnated with muriate of soda. A few native salt manufactories, indicated by small mounds on the banks of the rivulets, are visible on the left of the road.

From Devasamudrum, gneiss with its associated schists, mica, hornblende and chlorite, constitutes the prevailing rock to the bed of the Tumbuddra. Veins of quartz and felspar cross it in various directions, in which thin seams of an actynolitic felspar, of a lively green, not unfrequently occur. Near Hulhully, on the south bank of the river, a few dykes of greenstone and basaltic trap, containing augite, cut the gneiss in an easterly direction. Calcareous deposits, in the form of a nodular *kanker*, are seen in the rivulets running down the slopes of the plain to the river bed. The soil is *règur*, lying upon the gravelly detritus of the subjacent gneiss, &c., with here and there a thin stratum of *kanker* interposed. The cultivated vegetable products the same as before. The plants growing wild on the plain are principally the cassia auriculata mimosas, asclepias gigantea, and the jatropha glandulifera. The last named plant is almost confined to the black soil. The banks of the Tumbuddra at this point, are formed by an accumulation of silt, clay, and sand, brought down by the freshes. The bed is covered with a fine red quartzzy sand.

The Tumbuddra is crossed by basket boats to Mustoor, the first village in the Nizam's dominions. The plain rises gently as the traveller proceeds northwards to Nizam's country from the North bank of the Tumbuddra by Tawurghirry to Cundigul. Umaluti, a walled village about twenty-four and a half miles from Mustoor. Between this place and Tawurghirry, its

surface is broken by the protrusion of a bed of milky quartz, rising into a broken ridge of small hills; from which a gradual, but stony, descent leads to the decayed town and fort of Tawurghirry. Springs of fine water abound, and with numerous rivulets, maintain an almost unfailing supply of water. The latter feed the Tumbuddra, the bed of which constitutes the drainage line in this part of the Nizam's territories. Judging from the quantity of *kanker* found on the banks of these tributaries, a large proportion of lime must be conveyed by their means to the Tumbuddra, and thence to the ocean. The *règur* continues to cover the surface of the plain, with but few breaks, from the Tumbuddra to Umaluti, a distance of upwards of twenty-four and a half miles, though not perhaps to the depth seen in many parts of the Ceded Districts. This circumstance might probably be accounted for by the slopes here having a greater angle of inclination, rendering the superincumbent soil more liable to the denuding effects of floods, streams, and the heavy monsoon rains. The *règur* thus becomes blended with the alluvium washed down, and is seen as a stiff greyish mixed clay. Both the alluvial red soil and *règur* are impregnated with muriate of soda and natron. Salt manufactories are seen scattered over the country on the banks of the rivulets. Beyond Umaluti to Tawurghirry, the soil consists of the debris of granitic rocks; and is sandy, gravelly, or stony, according to situation, and state of disintegration. Near the bed of the Tumbuddra, I have before remarked, that the subjacent rock is gneiss and its associated schists. Quitting the bed, these rocks are less seen, while granite and greenstone constitute the prevailing rocks from Chuloor to Umaluti; the former occurs in bosses, knolls, and detached hills, with tors and logging stones, the latter in dykes and loose *boules*. From Umaluti to Tawurghirry, the granite rises in a more decided manner from the surface, taking a south-easterly direction. One of the most considerable of these elevations, is a range of hills a little south of the Tawurghirry road, called the "*Caradi Guddi*," from being infested by a number of bears, which are attracted to this neighbourhood by the fruit of the dwarf date, that luxuriates in the low moist valley. A bed of white and red quartz assumes the form of a low ridge, covered with jungle, and over which the road passes, called by natives, from its white appearance, "*Pilla Guddi*;" and running S.S.E. Some of

the quartz veins intersecting the granite, pass into hornstone with a splintery fracture. The granite is crystalline, and contains dark mica in scales; hornblende in small crystals; foliated reddish felspar; and greyish quartz in minute angular fragments. Hematitic iron ore exists largely near the bed of quartz: the slope of the ridge towards Umaluti is strewn with the slag and scorix of the furnaces formerly used for smelting it. The Hindus, I am informed, gave them up many years ago, owing to the exactions of their Mahomedan rulers. The agricultural produce of the soil is chiefly juari, cotton, and a little wheat; being at a distance from the river, it is indifferently watered; depending on the dews, springs, and the periodical rains. The majority of the springs about Tawurghirry are brackish—the formation granite, with reddish felspar, in clustered blocks, generally not rising above twenty or thirty feet from the surface. The soil around the town is reddish, arising from alluvium brought down the slopes of the ridge, and the disintegration of the granite rocks in the vicinity. It produces good crops of juari.

A little more than a mile N.W. from Tawurghirry, chlorite slate occurs in the bed of a rivulet in nearly vertical laminæ, interseamed with a reddish subcrystalline felspar, having a general direction of E. 10 S. though contorted and waving at various points: the general dip is to the N. About two miles farther on, a trap dyke intersects the schistose beds, running nearly East and West, and decomposes into a reddish brown soil. Three miles farther, near Idlapur, the chlorite, mica, and micaceous hornblende schists appear in the form of low hills, having an irregular direction; but which approaches that of the laminæ of the schists themselves. The chlorite schist predominates, and losing its chlorite, passes into both a ferruginous and a soft purplish shale, or slate clay, containing much felspar in a decomposing state. The summits of two or three of these hills were crested with a jaspery clay ironstone, with cherty quartz in parallel laminæ. A smoke-coloured vesicular quartz is found veining the chloritic slate, and a reddish tough subcrystalline *kanker* is seen in the hollows and sides of the hills. Large masses occur in the road side, imbedding small nodules of hematitic iron ore, which is profusely scattered in the bed of the rivulets. At Sassenthal, in the bed of a nullah, I found an angular block of a compact rock of a light ochreous yellow colour, having cavities lined with minute

yellowish pyramidal quartz crystals. Passing still north-westerly from Idlapur, the hills subside into long wavy swells to Moodianur. The chlorite slate is seen penetrated by a rock of reddish felspar and quartz, in which chlorite is scattered in thin lamellæ, which passes into eurite imbedding minute green crystals of tourmaline. Actynolite occurs in thin veins with quartz, and imparts a fibrous and radiated character to the rock. The direction of the laminae of the chlorite slate was found to be N. 55° W.; dip $58\frac{1}{2}^{\circ}$, S. 45° W.; general direction of joints N. 10° E.; dip 85° , E. 10° S. The larger beds of quartz conform in direction and dip to the laminae or strike.

About half a mile beyond Moodianur, the left bank of the Ramtar river, running towards the Kistnah, presents a small section of the rock composing the hill, the base of which it washes. It proved to be quartz rock, irregularly tinged with oxide of iron in almost tabular masses, separated by fissures, having the appearance of stratification, dipping to the N. E. at an angle of 13° . As I could discover no interstratified bed of any other rock, I hesitate to pronounce these the lines of stratification. Globular masses of a porphiritic greenstone imbedding reddish crystals of felspar occur on the surface. This bed of quartz rock lies between the chloritic schist and felspathic gneiss, the latter of which is observed about a mile further on, with a similar direction and dip as the former. Veins and beds of a jaspery clay iron ore, with calcareous incrustations, occur in parallel laminae to the gneiss, which extends into the Southern Mahratta country to Cundigul.

Near Cundigul the chloritic slate again rises to the surface as a cluster of hills, having the same smooth contour as those of Idlapur, and crested with a similar jaspery rock. Kanker and calcareous spar occur in the seams; and the surface is strewn with nodular hematite. Many of the specimens of the slate effervesced with dilute muriatic acid, impregnated with lime, probably from infiltration of water, charged with this mineral. The dip is to the N. 45° E. at an angle of 70° , the strike N. 45° W. Passing over the plain at the foot of these hills, about quarter of a mile from the village of Cundigul, a dyke of basaltic greenstone, running E. and W. is traversed. The green chloritic slate in its vicinity acquires a dull blue hue; becomes hard and compact, and

S. Mahratta country
from Cundigul to Da-
noor, on the S. bank of
the Kistnah.

splits into prisms having smooth planes. The contortions of the strata observed at some distance from the dyke, may be perhaps attributed to the intrusion of this rock. Gneiss is again seen in the beds of the Nundawarghi nullahs, alternating with mica, hornblende, and chlorite schist. It is red, felspathic, and contains veins of quartz, felspar, and actynolite. The last mineral often occurs in the seams with a compact siliceous felspar, having a lively green colour, sometimes in drusy crystals, and lining the interior of vesicular cavities. A dyke of basaltic trap crosses the plain in a West by Northerly direction. At the village of Nundawarghi, I remarked a number of millstones composed of a fine white and red granular sandstone, the grains of quartz cemented together by a felspathic paste imbedding angular and rolled bits of a dark flinty slate, derived from the slate associated with the gneiss and of a ferruginous rock. These stones I was informed were quarried at Badami and Jalihal, the price from $\frac{1}{2}$ to 1 rupee each. The red felspathic gneiss and associated crystalline schists are seen at intervals as far as Cumblihal, where I encamped in the plain. Here the gneiss becomes granitoidal, the red felspar still continuing six furlongs beyond Cumblihal; at the Muddi nullah it is seen alternating with micaceous schist. Dip 60°, E. 20° N. Nodular *kanker* of a faint red, and hematitic iron ore, strew the beds of the rivulets. Near Caradi, the granite loses much of its mica, consisting almost wholly of red felspar and greyish quartz, and assumes the character of a pegmatite and graphic granite. The green actynolitic felspar continues to intersect the rock in thin seams. At

Right bank of the Kistnah.	Coujaganur the Kistnah river is first seen : thence to Danoor, the tappal village near the ferry, the route lies along its right bank, to which the plain declines with a gentle slope that increases however near the river bed. Numerous streams cut the bank in their progress to the Kistnah, leaving intervening swells of ground, and rendering the road, which crosses them at right angles, uneven and difficult to traverse during the rains, when this tract is partially inundated by the river. In consequence of the thick superstratum of mixed alluvial and <i>règur</i> soil, few opportuni- ties occurred of observing the subjacent rocks. Gneiss, however, was the one most frequently met with.
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On the ascent of a low hill a little beyond the small fort of Haverighi,

a dyke of basaltic greenstone cuts the gneiss, running nearly due East and West, and slightly distorting the laminæ of the latter rock. Several ramifications are thrown off, one of which has a South-westerly direction. The trap here may be remarked splitting into prismatic fragments with smooth planes. The natives take advantage of this circumstance, and employ the stones thus ready formed in building.

In the bed of the river lie nodules of a reddish brown and white cornelian, chert, jasper, calcedony, cacholong, semi-opal with linear curved and angular delineations, and mocha stones. The pellucid pebbles are sometimes surrounded with an opaque *enduit* which adheres to the tongue, mealy externally, but hardening as it approaches the nucleus. The fracture of the inner part is semi-conchoidal, hardness from six to seven of Mohs' scale. Fragments of a dark coloured basaltic rock still adhere to these pebbles; which, together with their water-worn rolled exterior, indicate them to have been transported from the trap amygdaloids to the West. The swollen state of the river prevented any observation which the section of its banks might have afforded. The sides of the ravines, however, presented gneiss, with both white and red felspar, interstratified with micaceous hornblende schists. The latter has a fine and almost slaty structure, brilliant lustre, is easily worked, and split by the natives into long slabs for the purposes of building. Iron pyrites are disseminated. A trap dyke running to the East is crossed a little beyond Muddur. The strike of the gneiss, &c. though contorted in some places, runs E. 30 S. and dips at an angle of 60° to N. 35 E. The surface of the left bank is much the same as that of the right, it is covered with pebbles brought down by the river; among them I observed a water-worn bit of a grey limestone, probably brought down by the Kistnah from the plain at the base of the Western Ghauts.

It may be remarked, *passim*, that the Kistnah is one of the most considerable rivers of India. It rises among the Mahavaleshwar hills, near the western coast, a little to the S. W. of Satara, and after crossing the peninsula in an East by Southerly direction, falls into the Bay of Bengal at Sippelar Point, a little to the S. of Masulipatam. During a course of about 700 miles, it receives the waters of the Yairli, the Warda, the Gutpurba, the Malpurba, the Bima, the Tumbuddra, and the Hyderabad or Mussy

Bed of the Kistnah.

Remarks on the Kistnah.

rivers. Its breadth from bank to bank at Danoor, previous to its junction with the three last streams, as taken by trigonometrical measurement by my friend Lieut. Kinhead of the Artillery, and myself, was found to be 1918 feet. The current was running rapidly, carrying the round wicker basket boats, in which we crossed, a considerable distance down the stream, in spite of all the efforts of the boatmen.

Accumulations of mud, silt, and sand are daily progressing on the banks, entombing the remains of alligators, fish, and fluviatile shells. This river is thought to be richer in gems than any other stream in India. As it flows through the Palnad Circar, diamonds, cat's eyes, onyxes, and calcedonies occur in its alluvium; also a small portion of gold dust at Paugtoor, in the Nizam's dominions. Near the frontier of the Ceded Districts, beautiful agates are found. Not far from its mouth are some of the diamond mines for which Golconda is celebrated, and at Paugtoor, it abounds with amethystine quartz.

S. Mahratta Country,
from the North bank of
the Kistnah to Gurdinny.

After leaving the bed of the Kistnah, the plain rises gradually to the North. On the slope lie some scattered blocks of a fine grained granite, composed of crystals of reddish felspar, quartz, and a black glittering mica in minute plates. The superstratum of soil beyond the alluvium of the river is red and quartzose. Passing in a West by Northerly direction, we reach a long low descent, which slopes gently to the west, to the bed of the Hirri, one of the tributaries to the Kistnah: from this the ground again rises with an almost imperceptible ascent to the west, forming a shallow valley running almost due north. The Hirri river follows its course from Bagwari, flowing southerly to the Kistnah, into which it debouches a little above its junction at Capila Sungum, with the Malpurba. It forms the principal line of drainage of an extensive and fertile tract. Our route lay on the left bank of the stream. In the lower, or more southerly part of the valley, a felspathic zone, extending in an easterly direction and several miles broad, is crossed. This rock varies in lithological character, in some places assuming the form of a pegmatite, at others that of a protogine, being combined with quartz and chlorite. A few loose and imbedded blocks of a granite, similar to that found on the north bank of the Kistnah occur, rarely without rising to any considerable height above the surface. The felspathic rock observed in sections presented by the deep nullahs run-

ning down the slope of the plain, has a pseudo stratiform appearance, arising from nearly horizontal joints, which might be mistaken for the lines of stratification. It continues as the surface rock as far as the village

S. W. limit of the of Gurdinny, near which it is overlaid by beds of great overlying Trap a friable trap, approaching wacke, with an ob- formation.

scurely schistose structure, and penetrated by veins of an earthy carbonate of lime, calc spar, and quartz in crystals. It rises near the village into a small knoll, down whose declivity runs a rivulet, in the bed of which the first section of the great overlying trap formation of the Deccan met my eye. Depositions of *kanker*, both in beds on the surface, and veins penetrating the fissures in both rocks, occur in abundance; it is found in a pulverulent and concrete state: the nodules are not so crystalline as those that are seen in the vicinity of the older trap dykes, which penetrate the granite and gneiss of the Carnatic, the Ceded Districts, and Mysore.

About two miles to the north, on the rising ground on which stands

S. Mahratta Country the little fort of Beylhal, the road is literally from Gurdinny to Bag- paved with the *boules* of trap, which, exfoliating wari. in concentric lamellæ, leave circular and oval

nuclei, the latter in their turn, however hard and compact, evince a tendency to a similar process of disintegration. This gives a singular appearance to the surface of the road where the rock is uncovered by dust; presenting a surface paved, as it were, with mere pebbles of compact basalt set in concentric rings of wacke. The nuclei remain prominent from their superior hardness. Calc spar of various shades of white, green, and pink, calcedony in perforated nodules, and in geodes exhibiting concentric annular delineations, and lined with minute crystals of quartz, semi-opal and jasper occur in veins imbedded in wacke.

At Umblanur, a walled village in the jaghire of the Mahratta chief Punt Pritti Niddhi, about three miles north from Beylhal, I found the nuclei to consist of a hypersthenic felspar, imbedding crystals of augite, fracture small grained uneven; streak greyish white. Bits of a dark flesh-coloured eurite, and a porphyritic rock composed of crystals of dark dull green hornblende, imbedded in a paste of a faint bluish green felspar, exceedingly tough under the hammer, occur in the plain. I searched, but in vain, for these rocks in situ; although judging from

the sharp angles of some of the fragments, their proper locality cannot be far distant.

From Umblanur, still proceeding northerly, to within three furlongs from the town of Bagwari, the route continues along the left bank of the Hirri. The trap is observed in the nullah beds to undergo many changes in texture and colour, even in the space of a few yards, from a compact heavy basalt to a friable wacke ; from globular to schistose ; from black to red and a light brownish speckled grey. The laminæ of the schistose variety are often intersected by transverse fissures, which divide the rock into rectangular and rhomboidal prisms, similar to those observed in clay slate near the line of contact with a basaltic dyke. These again, by the agency of the mysterious law of crystallization, which is manifested in a greater or less degree, in both ancient and modern trappean rocks, from the microscopic atoms of augite and hornblende to the prodigious pillars of Staffa and the Giant's Causeway, often assume a pentagonal and hexagonal shape by exfoliation. By process of farther exfoliation the angles are worn away, and the prisms assume a globular appearance, which has led some observers to imagine them to have been erratic boulders subjected to the rolling action of water, or from their abundance, and the augite often found in them, to have been showered down on the surface by volcanic agency. Near Bagwari, the beds of the streams abound with *kanker*, indurated ferruginous clay, fragments of red and yellow jasper, trap, amygdaloid, and a few nodules of calcedony ; the concave surface of the botryoidal varieties of this mineral not unfrequently exhibit a succession of pentagons and hexagons.

From Bagwari to Mangoli, the route lies over plains, the lowest stratum of which, as seen in wells, to the depth of twenty to fifty feet below the surface and beds of nullahs, is the overlying trap. About two miles N.W. from the former place, it is overlaid by a sheet of a conglomerate composed of a nodular and pisiform iron ore, and fragments of ferruginous clay imbedded in a travertine-like paste of carbonate of lime, coloured of a light ochre brown by oxide of iron. The bed of a nullah presented the only section (of this stratum) ; it was here four feet thick covered by a layer of black cotton soil or *règur*, and resting immediately on the concentric exfoliating trap which was penetrated by seams

S. Mahratta country
from Bagwari to Bijapore.

of a whiter and more earthy carbonate of lime, as shewn in the right hand corner of the plan.

Large masses of a lateritic rock, cemented together by calcareous and ferruginous matter, and having a smooth shining *enduit*, which imparts a glazed appearance to the surface, occur in the calcareous conglomerate. The extent of the latter, owing to the thickly covered nature of the soil, I was unable to trace; but it is met with at various places between Bagwari and Mangoli, and most probably continues, almost uninterruptedly, overlying the trap for the greater part of the distance; viz. twelve and half miles. Near Mangoli, the trap again appears as the surface rock, seamed however, and almost broken up, by the immense quantity of calcareous matter penetrating between the laminae. The line is seen to take up some of the colouring matter of the augite or hornblende of the trap, and is stained of a mottled green and brown. The trap exhibits superficial dendritic appearances, generally dark brown, with a yellow or brownish ground on the smooth surface into which it readily divides on being struck with the hammer. This facility of division arises from natural microscopic fissures pre-existing in the substance of the rock, sometimes visible to the naked eye. The fragments are of different shapes, but almost invariably angular, and frequently prismatic. The trap varies from a compact black and phonolitic basalt, to a loose light greywacke, speckled with minute ferruginous spots, and still preserves both the laminar and globular forms described above. Veins of a reddish colour, without any definite direction, are observed intersecting it. Their composition does not appear to vary much from the dull brown grey rock that forms the prevailing colour of the trap in this vicinity, except in being more ferruginous. Deep and nearly vertical fissures dipping generally to the W. 70° S. cleave its tables in a direction N. 25° W. A number of small vesicular cavities pervade its structure, the axis of whose longest diameter is generally N. and S., may be received as indications of the course here taken by this great *coulée* of trap.

The view of the city of Bijapore, as the traveller approaches it from

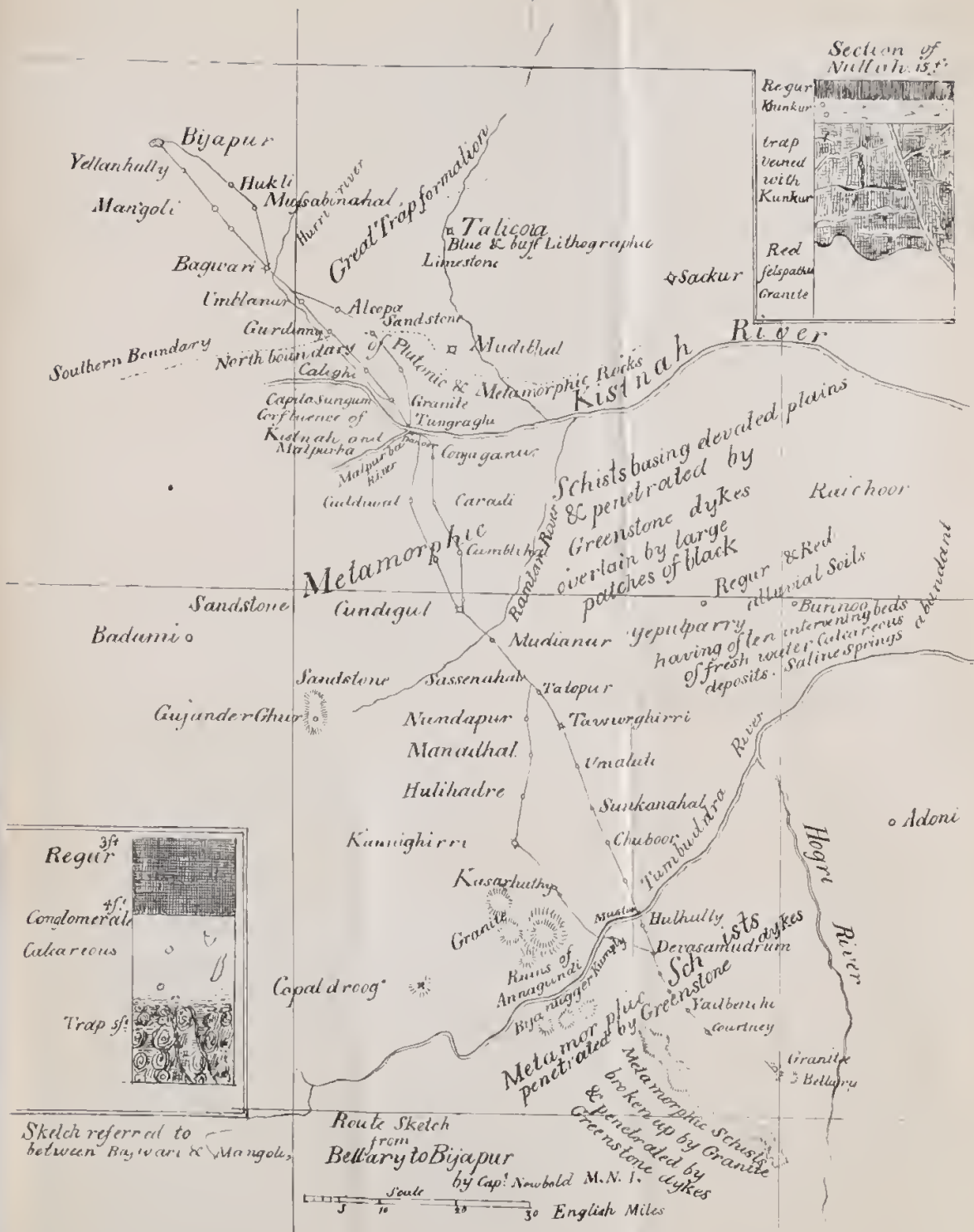
Mangoli, is truly striking, and peculiarly oriental.

City of Bijapore.

As in the distant view of Istambul from the sea of Marmora, spires, minarets and cupolas, some of which are topped by the crescent still glittering, the *donec impleat orbem* of Mahomedan

ambition, now all crumbling into dust by the Almighty fiat, rapidly shoot up in succession to the view in the distant horizon. I entered the city by the Futteh gate, near which is the breach in the wall made by Aurungzebe's batteries, and rode through a heap of ruins, gardens, and tombs, (literally a city of sepulchres,) which extends nearly to the Shahpur gate, where there is a small bazaar. Beyond it, the elegant mausoleum of Ibrahim Ali Adil Shah, stands at a little distance from the city walls, nearly opposite the western, or Mecca gate, having an extensive garden in the rear. The tall and graceful minarets of this harmonious structure contrasted in their whiteness with dark masses of foliage in the back ground, throw a lightness and airiness over the whole, altogether enchanting. The gilded arabesque work, comprising sentences from the Koran, into which the screen of the mausoleum has been carved, is rudely shattered by the balls fired from the city walls to dislodge Aurungzebe, who had established himself in the mosque behind the tombs. Fascinated by the beauty of the place, I directed the camel drivers to ease their animals of their canvass load, and fixed on a spot shaded by some fine old trees as the site of my little encampment.

The staple articles of cultivation are red and yellow juari, (*Holcus Sorghum*); bajra, (*Holcus spicatus*); culti, (*Glycine tomentosa*); moong, (*Phaseolus mungo*); thoor, (*Cytisus cajan*); bullur, (*Dolichos lablab*); and white lobey, (*Dolichos catiang*). These are comprised in the Mungari, or early crops, and are generally sown in June and July after the early showers of the S. W. monsoon, and are reaped about the end of December. Cotton, wheat, white juari, the castor oil plant, and chenna, (*Cicer arietinum*), are the staple articles of the late, or Hingari crops, and are almost invariably sown in *régur*, during the months of September and October, and cut about February or March. A quantity of caradi and kusum, (*Carthamus tinctorius*), are sown with the Hingari crops, from which the staple oil of the country is chiefly produced. Cocoonut trees are but seldom seen. In consequence of the almost total absence of tanks, and other sources of artificial irrigation from which a constant supply of water can be kept up, but little rice is sown; the subsistence of the peasantry therefore is chiefly on cholam and wheat cakes. After reaping, the ryots have a custom of heaping up the straw in the fields, and covering the stacks over with a thick



layer of the black soil, which is said to preserve it effectually from the ravages of animals and insects. In the Ceded Districts, it is generally carried off to the villages and there stacked. This custom of heaping it up in the fields is ascribable to the almost total absence of carts and bandies in the South Mahratta country and the Nizam's dominions.

The principal trees growing wild in the plains from Bellary to Bijapore, are the *Acacia arabica*, the *Melia azadirachta*, *Butea frondosa*, *Ficus indica*, *Ficus religiosa*, *Spondias mangifera*, and a tree called the "*Jummi*," held sacred by the Mahrattas.

The principal wild shrubs of the plain are the *Cassia auriculata*, the *Asclepias gigantea*, *Indigofera cærulea*, and several species of *Mimosa*. The *Webera tetrandia*, *Cassia fistula*, the *Zizyphus jujuba*, *Ixora parviflora*, the *Carissa spinarum*, *Carissa carandas*, the Bander and Hingar, are generally found in the red soils, while the *Jatropha glandulifera*, as before stated, is almost confined to the *règur*. On the declivities of the granite hills, bushes of *Euphorbia*, Cacti, the *Annona squamosa*, and less frequently the *Agave vivipara*. That delicious flower, the *Nerium odoratum*, grows in abundance on the banks of the Tumbuddra. The tamarind and mango trees are seen planted in a few scattered groups or topes. The *Solanum lycopersicum*, the *Calyptranthes caryophyllifolia*, the *Musa paradisiaca*, and the *Feronia elephantum*, are seen in orchards near the villages.

Notes principally Geological, from Bijapore to Bellary, via Kannighirri.

By Capt. NEWBOLD, F. R. S. &c., Madras Army.

No. 2.

The city of Bijapore stands on an immense sheet of overlying trap, with an undulating surface, though here and there small step-like descents, characteristic of trappean formations may be observed; but none of sufficient altitude to disturb, to any great extent, the generally level appearance of the surrounding country. As far as the eye can reach, on the north-west horizon are seen, from some of the higher points of the city, low, wall-like, ranges of sandstone. The almost unbroken extent of the plain of Bijapore affords but little scope for the geological examination

of the strata subjacent: the observer must therefore dive into wells, pass up the beds of rivulets that water the surface, search for quarries, and descend into the fosses that surround fortified places. In failure of all these, the walls of forts and other buildings present a mineralogical collection on the large scale which usually affords a clue to the petrographical nature of the surrounding formations, as natives seldom trouble themselves to bring building-stones from any distance, preferring mud if the former material be not at hand. The surface of the plain is in general strewn with fragments of trap, amygdaloid, quartz, calcedony, opal, cacholong, calc spar and zeolites, kanker, nodular iron ore, and a conglomerate of ferruginous clay and iron ore imbedded in compact kanker. These decomposing together in unequal proportions, form a superstratum of a light brown soil, in which small crystals of a pearly calc spar and zeolite glitter like particles of silvery mica or talc, in soils formed by the decomposition of gneiss and granite. This light-brown soil is extremely fertile, producing abundant crops of wheat, chenna, bajra and juari: it is very different in colour and appearance from the *règur*, which I have seen covering with its black crust, rocks of all formations, at heights above the present drainage level of the surrounding country, the granite and gneiss of Bellary, a small part of Mysore, the limestone and sandstone of Cuddapah, and the states at the foot of the Nulla Mulla hills. Beneath this soil the trap, in public roads and other places liable to abrasion, is often seen in the state of the concentric decomposition alluded to in speaking of Beylhal, and also in a schistose form. In deep sections, such as wells and quarries, the rock assumes a tabular appearance, splitting almost horizontally into thick stratiform masses, which are again intersected, at right angles, by almost vertical fissures, imparting a columnar structure. At Turvi, a village about four and a half miles from the Mecca gate of Bijapore, beyond the ruined palace of Aurungzebe, the basalt rests conformably upon a bed of amygdaloid into which it passes. Large beds of the amygdaloid occur in the trap, rising above its surface, as seen near the Allahpur gate of Bijapore.

The fissures, though nearly vertical, do not appear to indicate any axis of disturbance, dipping irregularly. At the
 Fissures and joints. bottom of a well at Tangoli, about fifteen miles south of Bijapore, the direction of the fissures was N. 25 W., dip W. 20

S., joints horizontal. At the quarries of Bijapore, the fissures took a direction N. 20 E., joints dipping 5° to E. 20 S. Calc spar occurs in thin discoloured seams, lining the fissures. A number of empty vesicular cavities pervade the rock, which appear never to have contained any mineral substance, and probably were occasioned by the evolution of gases while the rock was in a liquid state. Their direction is not uniform, but it will be found generally south-westerly, conforming to the axis of the trap's direction.

The petrographical structure varies often in the space of a few feet, from a compact greyish black basalt, having a granular structure and conchoidal fracture, with streak of ash grey, to a soft wacké speckled with brownish decaying crystals of augite and amphibole. The trap in this vicinity has a blush of red traceable in the darker portions, and becoming stronger in the wacke and amygdaloid; the latter has for its basis, a fine red clay. The dark compact variety melts into a black glass, and is faintly translucent at its edges, exhibiting a dull green; the rest are opaque, and melt with difficulty into a greenish black glass. Some varieties, which appear to contain much silicious matter, are infusible. The less compact trap has an uneven fracture. When reduced to a coarse powder, a few of the fragments are taken up by the magnet; the fine powder is of dull greenish grey. It does not gelatinize when treated with acids. Its specific gravity I found to be 3.35.

The variety used in building the splendid palaces, mosques, and mausoleums of Bijapore is of a deep reddish brown opaque, and of a granular fracture, approaching earthy. This rich colour adds much to the appearance of the ruins. The rock is by no means uniform in texture, being more or less vesicular, amygdaloidal, or clayey, and subject to exfoliation: consequently, when the stone has not been carefully selected, it gives way under the superincumbent pressure; many of the structures are rapidly falling into decay on this account. The variable nature of the trap is perhaps most strikingly seen in making the circuit of the city walls, which are built upon the rocks from which their materials have been quarried. Not only is the disintegration seen in the walls themselves, but wherever they rest on an amygdaloidal foundation; which, exfoliating, splitting, and giving way, causes whole masses of masonry to be precipitated piece-meal into the fosse. Vertical

fissures in the walls commencing at the base, and proceeding upwards, mark the site of future and extensive ravages. The masonry on the firmer parts of the rock is in excellent preservation : if well selected, it would make a good building stone, and is capable of receiving a fine polish, as shewn in the bas relief round the Sijdeh recess in that little gem of Moorish architecture, the Mecca Mosque within the citadel, which is constructed of the more compact variety of the purplish amygdaloid just mentioned.

The basis of the rock is felspar, with amphibole and augite in various proportions. The latter mineral (augite) is not much seen in the red amygdaloid rock. Olivine is of rare occurrence. Vesicles are seen in all varieties, both empty and containing green earth, which becomes brown or black on long exposure, calcedony, cacholong, calc spar, quartz, zeolites chiefly radiated, stilbite, heulandite, and mesotype, when it assumes an amygdaloidal stamp. These minerals also occur in veins, and are most abundant in the red amygdaloid, to which they impart a reticulated or porphyritic appearance, as they chance to occur in veins or crystals. Geodes of calcedony are seen also containing drusy crystals of quartz and of zeolite, enclosing crystals of carbonate of lime. I have seen veins of crystalline quartz splitting in the centre, in a direction parallel to the sides, containing all these minerals on their inner surfaces. Agates are sometimes, but rarely, found imbedded; greyish crystals of glass of felspar are met with in the semi-compact varieties; also small nodules of a compact cream coloured opaque zeolite with a faint tinge of buff, and marked with concentric annular delineations, resembling in shape those in orbicular granite.*

Marched this morning, (July 9th,) on the new route to Hukli, a

From Bijapore to place about twelve miles S. E. from Bijapore.
Bagwari.

The brown soil, arising from the disintegration of the subjacent trap continued about a mile, when it was succeeded by the *règur*, strewed with abundance of grey kanker in small nodules.

* Some of these nodules are earthy, and have a powerful argillaceous odour. The most compact have a hardness about seven (Moh's) fracture semi-conchoidal, inclined to splintery—opaque. Before the blowpipe they intumesce, and phosphoresce slightly. They gelatinize when treated with nitric and muriatic acids. Some of them inclined acicular, microscopic and minute crystals of a mineral resembling chabasite.

At about three miles from Bijapore, the kanker and iron ore conglomerate occur in masses: the latter is used as a revêtement to a small well into which I descended, and found the water percolating through layers of kanker, dark earth, and iron ore. The fissures were nearly vertical; direction N. 5 E., dip S. E. by E. Trap, generally covered by a bed of reddish kanker, on which rests the cotton soil, passing into a reddish amygdaloid, reticular and porphyritic, containing calc spar and zeolites, continues to Hukli. Portions of its red clay basis intumesce, and curl up before the blowpipe, indicating the existence of numberless minute particles of zeolite disseminated throughout its substance. With muriatic acid, it formed a gelatinous mass; in this respect resembling the Silesian variety of basalt analyzed by M. Löwe of Vienna. Wells of fresh water are of frequent occurrence. The same formation continues to Bagwari. Between Hukli and Bagwari, a branch of the Doni is crossed, having black steep banks of cotton soil; this stream is a treacherous bed of saline and sluggish water, unfit for the use of man or beast. The earth of its banks is highly impregnated with muriate of soda, as shewn by the efflorescence on the surface, and by the adjacent salt works. About seven miles from Hukli, between Musibinahal and Bagwari, I observed a flat topped hill, about a mile from the left of the road. It was composed from base to summit of a tabular lateritic rock. Cuboidal masses of the same crowned the summit, exactly resembling the masses on the tops of the smooth laterite hills of Malabar and Canara. Farther east, about a mile, runs a low ridge of hills with a N. E. and S. W. direction; the flat contour, and waving direction of which powerfully reminded me of the laterite hills on the Western Coast. I examined the end of the range, and found it to be of the lateritic rock just alluded to; the rest also appear to be of the same rock. About twelve miles to the south of these, rise two other flat topped hills at Nagarwar, which I am assured by the natives, are of the same rock. The small hill of Hori Math, near Ingliswar, celebrated as being the site of the miraculous birth of the founder of the Jungum sect, is entirely composed of the lateritic rock. These lateritic hills are remarkable, as rising above the low trap elevations amid which they are situated, and are the only hills of any height to be seen for miles around. This circumstance, which is not of rare occurrence in other parts of India, is evidently the result of the denudation of the subjacent trap,

the beds of laterite being once probably continuous over its surface. The trap is seen in the vallies and nullahs at their base, on which the lateritic rock rests in tabular, horizontal masses. A siliceous porphyritic rock, having cavities lined with minute brown crystals, is associated with this rock, and is found in loose blocks on the surface. The imbedding paste is a light coloured highly indurated jaspideous clay. Before the blowpipe *per se*, the crystals lose their colouring matter, but fuse with carbonate of soda into a white enamel.

Went about two and a half miles to the east of Bagwari, to see the Quarries of Bagwari. quarries whence the compact blackish trap is dug, used in building the walls of that town; found the quarry to be nothing more than a large assemblage of basalt *en boules*, lying partly on, and partly imbedded in, the soil covering a long swell, probably a basaltic dyke, through the surrounding trap. I searched in vain for an excavation affording a section of the intrusion of the former. The basalt is different in mineral structure from that seen passing through the granite, gneiss, and slate of the Ceded Districts, the Nizam's dominions, Mysore, Malabar, and Canara. It is now amygdaloidal and vesicular, and contains small globules of calcareous spar, zeolites, and calcedony. The vesicles, however, are more usually empty: some of them contain a brownish yellow earth into which I have observed the zeolite to decay, and also calcareous spar, coloured with the peroxidation of iron, which exists plentifully as the black protoxide and carbonate. The fracture is conchoidal, fragments faintly translucent at the edges; streak, greyish white; melts before the blowpipe into an intense green glass. It contains little amphibole, and appears to be composed almost entirely of augite and felspar.

The lateritic rock in the vicinity of Hori Math appears, generally, Lateritic rock of Hori Math. to contain more iron than the rock of Malabar and Canara, and is consequently of greater specific gravity. The specimens I obtained did not contain lithomargic earth, nor so much quartz as the latter; the tubular sinuosities are frequently lined, like those of the Malabar variety, with an ochreous earth arising from the decomposition of quartz and felspar, and tinged of various shades of brown and yellow by the oxide of iron; this earth forms a compact paste, cementing more firmly the component parts of the rock together: it exactly resembles in this respect, portions of the Malabar

laterite. It is not so soft interiorly. This paste adheres to the tongue, and gives out an argillaceous odour when breathed on. The more compact parts of the rock, forming the coating of the tubular cavities, become magnetic before the blowpipe, and are converted into a dark grey slag.

Proceeding in a S. E. direction by Jawannaghi and Narsinghi, to Alcopa, From Bagwari to Alcopa. a village east of Umblanur, the road lies diagonally across the low trap swells which have generally a S. W. direction, though their lines sometimes intersect each other at obtuse and acute angles. The tops of the swells are mostly slightly convex, though often terrace-like, and are composed of the more compact and globular trap. In the banks of nullahs, the trap and amygdaloid may be observed alternating, and passing into each other: when they occur horizontally, the trap is generally the surface rock; this may be owing to its superior hardness, and capability of withstanding the abrasions caused by the elements. The amygdaloid contains irregular bits of decaying felspar and numberless vesicles, often filled with green earth and crystals of carbonate of lime. The former mineral, in moist situations, assumes a black or deep brown colour in decomposition, giving a speckled appearance to the rock, resembling that of the toadstone of England. Before the blowpipe, these dark spots are converted into black slag. In the bed of a stream, a few hundred yards N. W. from the village of Kunkal, I found slender prismatic crystals of carbonate of lime fasciculated in sheaf-like forms, with dark pieces of chert in a friable mass of the amygdaloid; the radii of the calcareous crystals were three inches in length, and of a faint amethystine hue.

About two miles to the north of this village, indications of a change in the formation were seen in the angular bits of red pegmatitic and quartz rock, that occur on the plain and in the beds of nullahs, which become more frequent as the villages of Kunkal and Alcopa are approached. A few hundred yards south of the latter, I found these indications confirmed, and the quartz rock in situ, in tabular masses in the bed of a nullah. Alcopa is situated near the south-eastern foot of a slope, on the top of which the trap has the usual compact and globular form; while at the base it is tabular, schistose, and amygdaloidal. A few hundred yards to the south of this village, the trap formation ceases at the foot of a low range of flat-topped hills of sandstone. In the hope

of discovering the line of termination, I spent several hours in searching the beds of streams, and visiting the quarries in the neighbourhood, and at last discovered it in the bed of a nullah, about three hundred yards south of the village : here, after clearing away the gravel and detritus composing the bed, I distinctly saw the trap overlying the sandstone, and penetrating some of the numerous fissures that cleave the latter. I had anticipated this fact from the circumstance of the little disturbance in the latter rock, which occurs in tabular horizontal masses, having a rhomboidal shape from being intersected by fissures with a varied direction, but generally N. 65 W., crossed by others trending S. 20 W. Where the trap had penetrated them, I did not find the two rocks adherent, or passing into each other ; but perfectly distinct and separate, and occasionally a thin calcareous seam intervening. Both the trap and sandstone seem to be slightly altered by contact, the former becoming less crystalline and more earthy, but often extremely tough, and splitting into small fragments, with numerous microscopic fissures intersecting its structure. The colour of the sandstone, from a few lines to several inches distant from the contact, is generally reddish, passing into a deep reddish brown. There was no appearance of semi-fusion, or intermixture, nor entangled masses of sandstone in the trap, a circumstance coinciding with the observations of Lord Greenock, in his account of the phenomena displayed by the igneous rocks in the neighbourhood of Edinburgh, in their relations to the secondary rocks : nor did I observe any solidification in the former, as noticed by Professor Hausmann, in the sandstone altered by heat near the blast furnaces at the Steinrennerhutte in the Harz : on the contrary it was of a looser texture than ordinary. In structure, from a loose and variegated grit, it approaches a compact quartz rock, containing disseminated portions of decomposed felspar, which falling out, leave a number of minute oval cavities. This stone is much used in building by the villagers in preference to the trap. I saw no veins penetrating the sandstone ; pegmatite occurs in scattered blocks : the situs of this rock cannot be far distant, judging from the sharpness of the angles of these fragments.

Proceeding in an easterly directions towards Talicota, the trap formation extends to the village of Mudkeysur, three
 From Alcopa to Talicota. coss from Alcopa, when it is succeeded by a
 bluish grey compact limestone, which I first observed in the bed of a

nullah. No section occurred, shewing its contact with the sandstone ; the surface of the country being covered with a thick stratum of soil, but from the easterly dip of both rocks, it is evident that the limestone is the uppermost. It continues the surface rock to the most easterly point of my observation ; viz. Talicota. In a deep well at Munjghi, a coss west from Talicota, the bed of the Doni river and the plain in front of the Talicota fort gate, it occurs in stratified masses, with a very slight dip, varying according to the rise of the plain. In the well, the dip was only $2\frac{1}{2}^{\circ}$ E. 5 S. Dividing the limestone from the surface to the bottom of the well was a fissure, a foot wide, direction S. 5 W., filled with a buff-coloured earthy kanker and angular fragments of the limestone rock. The latter in mineral character resembles the Cuddapah limestone, but is generally lighter in colour, varying from dark blue to pale buff or cream, and has few traces of pyrites.

The minerals associated with it, are hematite in small nodules, often occurring disseminated like strings of beads through its structure, which falling out, leave regular lines of small holes that resemble the perforations of boring insects, and the tubular sinuosities in laterite. Angular fragments of a buff-coloured jasper are strewn among those of the limestone, and from their variolated exterior, appear to have been in contact with the basalt, possibly limestone passing into jasper. I have often noted the Cuddapah limestone passing into chert, from contact with basaltic dykes. The softer and finer varieties of the cream-coloured limestone found in the vicinity of Talicota, are well adapted for lithographic purposes. Some of the specimens which I brought hence, were sent down to the lithographic establishment at St. Thomas's Mount, and found to answer. There is also a fine laminar limestone found in the bed of the river, with beautiful dendritic appearances between the plates.* The plain of Talicota is averred by Ferishta to have been the theatre of the overthrow of the Hindu empire of Bijanugger in A. D. 1564 ; where Ram Raj, its sovereign, was totally defeated

* A specimen of this dendritic limestone was examined for me, by Dr. Wight, who kindly affords me the following note: "The arborescent appearance in the slate I think an organic remain. At least I find, when under a high magnifying power, that the black lines can, with the point of a needle, be picked off without touching the stone, as if the carbonaceous matter of the plant was still there. I feel uncertain, however, whether to call the original a *moss* or a *fucus*, but think the latter."

and slain by the combined armies of the four Mahomedan kings of the Deccan ; viz. those of Bijapore, Golconda, Bider, and Ahmednugger. Few, if any, of the present Hindu inhabitants of the place, however, had any tradition of this having been the site of the battle ; and even Mahomedan historians differ, placing it farther south. Talicota is now, (1838,) the capital of a small territory held in jaghire from the British, by a Mahratta chief of the Rastia family, named Bala Sahib. It is situated in a plain on the left bank of the Doni river, which flows into the Kistnah, and separates the jaghire from the Mudibhat talook. The river is about 150 yards broad, and was easily fordable when I crossed it in the month of July. The banks are steep and clayey ; the bed, as before mentioned, consists of great slabs of laminar limestone. Talicota is erroneously placed in some maps on the right bank of the stream. Besides the town walls, which are of stone, it possesses an inner fort, or citadel, in which the palace of the Rastia, a high stone house with small windows and loopholes, is situated. The palace has nothing but a guarded gateway to distinguish it from the substantial dwellings of the Bunnias and Lingayet merchants of the place. Near it, is the holy and celebrated Mahomedan shrine of the Five Saints, "*Durgah-i-punj-Pir.*" The pettah is large and spacious, and has a broad street, in which are the shops of the Jain venders of brass-ware, numerous calico printers, dyers, &c., for whom the place is noted. There is a small private Jaina shrine here, into which I was shewn by the Jaina merchant who accompanied me. It contained several white marble images of the principal *Tirthunkars*, brought from the north, (*Uttara Dés,*) together with the *Pancha Purmestri* in brass. There was also a brazen bas-relief of all the twenty-four *Tirthunkars*, the gigantic *Ardeswara* standing naked in the midst of the saintly group. The following is an approximative statement of the population of the town :—

Mussulmans, principally weavers and soldiers,	..	..	1,500
Vaisya Comptis, grain and provision sellers,	..	..	125
Mahratta dyers and cloth printers,	..	..	500
Lingayet cloth merchants,	..	..	1,000
„ weavers,	..	..	250
„ oil-makers,	..	..	50
Kunbis, agriculturists,	..	..	1,000
Carried over,	..	..	4,425

Brought over,	..	..	..	..	..	4,425
Mahratta tailors,	..	..	..	..	..	250
„ saddlers,	..	..	..	..	..	50
Brahmins of the Smarta and Vaishnavam sects,	..	..				500
Jains of the Vaisya sect,	..	..	..	..	..	15
„ „ Chsetriya sect,	..	..	..	..	..	25
„ „ Suryonsh Chsetriya sect,			..	..	..	25
Jain Upadi, or inferior priest,	..	..	..	..	..	1
Total, ..	..	..	..	..	..	5,291

Besides the above, there is a body of one hundred Mahratta horse and sibundies, maintained by Rastia; and a floating population of that wandering class of grain merchants, the Brinjaris, with whom the bazar was crowded. The revenue of the jaghire is estimated at about 10,000 rupees per annum. At the time I visited the place, Talicota was in charge of Nana Sahib Rastia. Bala Shahib, his elder brother, was engaged in a religious pilgrimage to Gungapur, on the banks of the Bima.

I observed the limestone to the S. W. of Talicota nearly five miles.

From Talicota to Mudibhal. About two miles farther in the same direction, the overlying trap occurs in the bed of

a nullah, a little to the E. of the village of Gonahal, and continues for about a mile, when sandstone, in isomorphous masses, forms the surface rock, and is also seen in the bed of a nullah, in which lay angular blocks of both the above-mentioned rocks and fragments of the red pegmatitic stone. Trap prevails between Gonahal and Contogi: it is seen a little to the west of the latter village, overlying the sandstone in the bed of a nullah. The latter rock is here observed to separate into contorted laminar flakes of a reddish hue and friable structure near the line of junction: the former is earthy in texture, as before observed. A few feet from the junction, the sandstone resumes its usual texture and colour. Between the flakes calcareous incrustations have taken place. Between Contogi and Mudibhal, trap and amygdaloid are the surface rocks. Immediately to the west of the latter place, rises a low ridge of finely grained sandstone, where the quarries for millstones, for which Mudibhal has long been known in this quarter, are situated. The rock lies immediately under a stratum of *règur*, in tabular masses, in-

tersected by vertical fissures running E. and W., and crossed by others at right angles : horizontal fissures also occur, dipping at about one and half to the E., these afford great facilities to the *Wudras* in excavating masses for pillars. A sort of pickaxe, wedge, heavy hammers, and levers are the only implements used : blasting is had recourse to, to split the larger blocks into pieces for the millstones. The masses of rock, though red, and variegated near the surface, are generally white and crystalline in the centre, having decaying portions of felspar disseminated. The millstones are shaped on the spot, and exported to the surrounding districts and to the Nizam's territories. They fetch from four to sixteen annas each ; fire is not used to separate the masses, as in granitic rocks.

A little west from the sandstone hills, the red felspar rock, with mica interspersed, occurs in unstratified knolls and masses. This continues to Hallighirry, whence the formation to the Kistnah is gneiss, with a few blocks of the granite protruding. A dyke of the crystalline greenstone occurs between Lepghirri and Hallighi, E. and W. direction. The Hindus rarely employ the overlying trap for building, preferring to bring sandstone or granite from a considerable distance. This is shewn in the old Hindu temple in Bijapore and villages in the vicinity of Contogi. East of Mudibhal the Idgah hill affords a good specimen of the globular trap ; it resembles the greenstone dykes of the Ceded Districts, at a distance, in colour and contour ; but the mineral character of the rock differs in containing little hornblende : it is tough, much less crystalline, and contains zeolite and calcedony imbedded in nodules. It decays into a deep red earth.

Crossed the Kistnah on the 15th July to Danoor and halted. Went to see the junction of the Malpurba and Kistnah on the 16th, about two and half miles west from Danoor. Crossed the Malpurba, about 200 yards broad, in a basket boat to the Delta, on the apex of which is situated the celebrated temple to the Lingum, in which Baswapa, the founder of the Jungum sect, finally disappeared, according to the version of his priests. The temple is evidently of great antiquity, small and not remarkable for beauty. I have a strong impression, that it was built by the Jains, from some peculiar symbols that have escaped the

The Capila Sungum, or
confluence of the Kistnah
and Malpurba.

mutilating hands of their opponents, such as the two elephants with elevated trunks over Lachmi, &c. The temple faces the east, and the sacred Ling is covered by a hollow silvered head of Mahadeo, which was taken off for my inspection : expanded behind it, rises the silvered hood of a *Cobra de capello*, forming a canopy to the whole. There is nothing remarkable about the Ling, which is a small one blackened by libations of oil, milk, &c. I was not near enough to see the depression, or mark, said to have been left on it at the place Baswana was absorbed. Facing the Ling, in the ante-room, are two Baswanas, or sacred bulls. At the point of the Delta stands an Acacia tree. The two rivers were flowing with considerable rapidity, and their turbid waters mingled in curling eddies near a small temple, almost submerged in the waves, containing a Ling. The three Maths of the three Swamis here are in a dilapidated condition ; that of Sencri Bharti is in the best state of repair. A brahmin performing *tapas* on a tiger skin, sat in a state of religious abstraction in one of the cells. The *Sthalla Puranam* of the place is in the hands of Ragovindra Achari, one of the three *Matha-mudras* whom I saw here ; the names of the others are Sencri Bhat and Bindu Achari. There are two *Sassanams*, one in the N. wall of the enclosure, the other near the ferry of the Malpurba in Hala Canara.

Rode from Cuddywal to Hunnagund, about five miles westerly.

Jain temple at Hunnagund.

There is a Jain temple situated in the S. E. extremity of a short and low range of hills ; it is in ruins ; the Gopar had been prostrated, and the sculptures considerably defaced. The temple fronts the east, and the doorways are flanked by mace-bearers in relief, with female figures on either side. The walls are decorated exteriorly with various sculptures : bayadères, lions, elephants, &c. in alto relievo, and present a mass of elaborate carving. Bas reliefs of naked *Tirthunkars* are interspersed, the larger in a standing, the smaller in a sitting, posture. The extreme length of the arms of the former, which hang loosely down by their sides reaching below the knees, reminded me of the description of those of Rob Roy. The sanctum had been rifled of its idols, but I observed a large one reared up in one of the entrances, which possibly had been abstracted thence, as it has evidently suffered displacement. It is an erect naked figure in high relief, executed on a block of fine sandstone, with the short curly locks, (resembling a Welsh wig,) elongat-

ed ears, and peculiar contour, that characterize the Jaina saints : from the hood of the *Cobra* extended like a canopy over his head, I judge the image to be that of *Purswanath*. The features and other parts have suffered mutilation. The interior of the place, fouled by bats and other animals, is supported by massive stone pillars, generally square, with tori : the ends of the architraves are carved into lion's heads, &c. The whole is of a light red sandstone brought from Himallya, few coss off. There is an inscription in the wall of the doorway; another slab bearing an inscription in Hala Canara lies broken near the threshold. The earth and rubbish have accumulated up to the knee of some of the images. The range on which the temple stands, is a bed of elevated jaspery rock with contorted laminae, and similar in appearance to that forming the copper-mountain ridge of Bellary. Direction N. W., dip 60 to 70 N. E.

From Sassenhal and Jumlapur to Nundapur, the road passes over From Sassenhal to the the N. W. extremity of the Idlapur schistose Tumbuddra. elevations, before noticed. From Jumlapur, where the chlorite slate is seen at the usual angle of elevation, the ground rises for about a mile, when a narrow greenstone dyke is crossed, running E. 10 S. About 40 yards farther, the main dyke is traversed, running in an almost similar direction, which covers the summit and descent of the elevation with globular and angular fragments, almost as far as Nundapur, a distance of three miles. At the base of the elevation on which this village is situated, the slate is seen in the bed of the nullah, dipping at an angle of 60 N. 45 E., *i. e.* from the dyke. The schists on the western side of the dyke, observed yesterday at Sassenhal, dip at an angle of 72 to the S. W., *i. e.* from the dyke. The greenstone differs not from that usually seen in the Ceded Districts, being crystalline or porphyritic near the centre, imbedding crystals of a greenish felspar, and becoming more compact as it approaches the edges : amphibole and felspar intimately mixed, are its chief constituents. Near its eastern flank these minerals separate, and it passes into a sienite, which is exceedingly tough under the hammer : the felspar crystals fast decomposing, form a compact paste. The chlorite slate, in the immediate vicinity of these plutonic rocks, loses its fine slaty character, becomes thick-bedded, compact, and of darker colour, and is penetrated in every direction by contorted quartzose veins, the

planes of which seem almost as various as their flexures. At the distance of a furlong and 100 yards S. E. from Nundapur, a red felspathic dyke occurs in the gneiss, almost concealed by a superincumbent mass of friable kanker : small crystals of a scaly graphite, with a shining steel-like lustre, occur disseminated in this vein. The gneiss alternates with chloritic slate and beds of a red felspar rock : its laminæ are much contorted, and have here an easterly direction. One mile and a furlong in the same direction from Nundapur, the bed of a stream is crossed, where a dyke of a compact reddish felspar rock (Eurite ?) cuts the gneiss in a direction of N. 60 E., flanked by a thick bed of reddish felspathic granite, containing both mica and chlorite in lamellæ, and a little quartz. This rock and the gneiss are much weathered. Six furlongs hence, the gneiss assumes a granitoidal form, appearing in rounded blocks with concentric exfoliations. Three miles from Nundapur, a trap dyke crosses the gneiss, running westerly ; and another, at four miles five furlongs, having a similar direction. A furlong from this, a large dyke of the red euritic rock, about 200 yards broad, occurs in the same direction, flanked by a bed of the red felspathic rock, large beds of kanker accompanying the intrusion of the dyke. I saw an immense bed of this calcareous rock, lying as a flat table on the gneiss near Manadhal. From this place to Kannaghirry, a distance of eleven miles one furlong, gneiss, granitoidal gneiss, forming gentle elevations, and scattered surface blocks occur ; the associated schists of chlorite and mica are less seen. A trap dyke occurs at the distance of five miles five furlongs from the former village ; direction W. 15 N.

In the bed of the stream, forming in part the fosse of the fort of Kannaghirry, gneiss is seen alternating with mica and hornblende schists, both thick bedded and laminar. On the N. E. flank of the fort, a dyke of pegmatite, with a close small grained sub-crystalline structure, is seen passing through the gneiss, and in a direction parallel with that of the laminæ. In the latter rock, a vein, (five inches broad,) of large crystals of felspar and quartz running N. 25 E., exhibits a dislocation to the E. of seven inches. A fissure traverses it for some distance longitudinally, running also into the schist. The walls of the fissure are lined by quartz passing into hornstone.

About four miles North by West from this, near the village of Hanumanhal, I saw on the road side a monument of a Hirlu, or a hero

slain in battle, evidently of high antiquity. It consisted of a slab of gneiss placed in a slanting position, on the surface of which a male and female figure were rudely sculptured in bas relief: the former was armed and in the attitude of combat; the latter, with uplifted hands, seemed in the act of throwing herself into his arms for protection. The relations and descendants place flowers and offerings of oil and milk, as offerings to the manes of the brave: the pious passenger deposits a stone, of which a large heap at the foot threatens to overwhelm the monument and the hero altogether. It is probable, many of the tumuli of loose stones observed in many parts of India, cover similar antiques.

I shall conclude these notes, with a few observations on what I term
 Concluding Remarks. the great overlying trap formation of Central and Western India, the southern limit of which has been just described, in contra-distinction to the hills and dykes of greenstone associated with the granite, gneiss, and metamorphic schists of Southern India, which I take to be a distinct and more ancient rock.* The overlying trap formation has a south-westerly course; its southern margin terminating, according to Mr. Fraser, near Malwan, in latitude $15^{\circ} 53'$ N. and longitude $73^{\circ} 47'$ E. on the Western Coast of the Peninsula, and its northern limit between Bulsar and Gundavie below Surat, between the 20th and 21st degrees of North latitude. Its boundaries at Gundavie, according to Dr. Lush, are strata of clay containing kanker. Proceeding southerly on the sea coast between Bassein and Surat, horizontal strata of sandstone are seen resting upon it, supposed to be identical with the fossiliferous rock of Kattywar, and which may be accounted as the newest sandstone formation of India. Still farther south at Bombay, it is fringed by a recent formation of coral and shells; and N. of Malwan, it meets with the greenstone, granite and sienite of Southern India. Thus the western extremity of this formation occupies in its breadth, an extent of sea coast approaching five degrees of latitude. Proceeding inland in a N. E. direction from the vicinity of Malwan, its southern boundary may be described by a line drawn thence through

* This opinion is chiefly grounded on the relative position, age of associated rocks, and mineralogical distinctions, which are very striking. The zeolites, chalcedonies, green earth, olivine and calc spars so abundant in the formation just described, are never or rarely seen in the trap a little to the S. of the Kistnah. The latter is never seen overlying fossiliferous rocks in continuous sheets, but occurs as dykes in granite and the older stratified formations.

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Merritch and Gurdinny, a village about 40 miles S. E. from the city of Bijapore to Bider; thence north of Hydrabad to Nagpore; and from Nagpore north-easterly towards Sohagepore and Sagur to the 82d degree of East longitude, as observed by Franklin and Coulthard. At Gurdinny it rests on granite, a broad pegmatitic zone intervening. A little to the east of Gurdinny, at Mudibhal, on a crystalline sandstone; and at Nagpore on granite. Its north-eastern limit has not been accurately defined; straggling *coulées* of a similar trap, (containing olivine, calcedonies and agates,) have however been traced by the Rev. Mr. Everest as high as Gwalior, which lies in lat. $26^{\circ} 15' N.$ and lon. $78^{\circ} 1' E.$ It is said to extend still farther toward the east up to the Rajmahal hills: though it would appear that its continuity here becomes broken up. Assuming Gwalior as its north-east corner, we will return towards the Western Coast by the northern limit, passing from Gwalior in a south-westerly direction to Neemuch; whence taking a direction more southerly to Dohud, as traced by Captain Dangerfield, it passes by the east of Baroda to the sea near Bulsar, a little to the south of Surat. On this last line the trap was found, at Sagur, to rest on shell limestone, and on the limestone, greenstone, quartz, argillaceous, and talcose rocks of Oodipore. At Bulsar, as before stated, it is bounded by strata of clay and kanker.*

Such is the unparalleled extent of this vast sheet of trap, covering a space, with some interruption, of 250,000 square miles.

Since writing the above, I have had the pleasure of perusing Col. Sykes's admirable paper on this great trappean region, and perceive that he assigns to it an area of from 200,000 to 250,000 square miles only; but adds, however, that it appears to him that the above are not the absolute limits of the trap. My own observations, taken during journeys to Bijapore, Bider and Culberga, will have served to trace its S. W. boundaries more distinctly than has hitherto been done.

* It is probable that the amygdaloidal trap found overlying a bed of limestone, containing oysters, limnæ, small melaniæ, &c. at Peddapungali near Rajahmundry, and discovered by Col. Cullen, is an outlier of the great overlying trap formation.

Ancient Inscription found at Aden. Communicated to the Asiatic Society by the Government of India. With a plate.

No. 29 of 1842.

*From Captain S. B. HAINES, Political Agent at Aden,
To J. P. WILLOUGHBY, Esq.*

Secretary to Government of Bombay, dated 29th September, 1842.

Political Department.

SIR,—I have the pleasure to forward to you the accompanying copy of an ancient inscription recently discovered in Aden, by the work-people employed in excavating the new road leading up from the Custom House.

2d. It is an interesting fact, that though Aden in its most flourishing era was the principal sea-port of the ancient Hymyari kings, that no Hymyaritic inscriptions previous to this have ever been discovered, either in the ruins of the ancient town, or its immediate vicinity; though on the shores of Hadramaut, and inland as far as Sana, many beautifully executed inscriptions have been found, and transmitted to Bombay. In every other case, however, the characters have been found on oblong marble blocks, generally forming part of a gateway, as at Nukbel Hajar, on the Hadramaut Coast; whereas, in the specimen now brought to light from a depth of twenty feet beneath the present surface of Aden, we have a circular slab of pure, and very compact white marble, with a raised rim round it, and apparently forming part of an altar. The inscription is not so well executed as many others that I have seen, but it is perfectly clear, without flaw or injury. In removing the stone, part was unfortunately broken off by the work people.

3d. The antiquity of this specimen may very safely be dated from the first year of the Hijera, when the last of the Hymyari princes reigned in Yemen. After the conversion of the Sabeeans to the Moslem faith, the altars erected to their gods were overthrown, and the religion of Islam universally prevailed. The character gradually became lost, as the Kufic writing spread over the southern and hitherto unconquered country of Yemen and Nedjran, and is now extinct. The learned professor, Gesenius of Germany, has succeeded in decyphering

and translating a small part of one inscription found by the officers of the "Palinurus," during the survey of the South Coast, and it is only to be hoped, that this specimen may afford an additional clue to assist him in his valuable and highly interesting researches, regarding a nation that has been so utterly swept away.

4th. The inscription, it will be perceived, is a fac-simile, being an impression from the stone, and its accuracy therefore may be depended upon.

I have the honour to be, &c.

Political Agent's Office, Aden,

(Signed) S. B. HAINES,

29th September, 1842.

Political Agent.

(True Copy.)

(Signed) J. P. WILLOUGHBY,

Secretary to Government.

(True Copy.)

P. MELVILL,

Assistant Secretary to the Government of India.

Meteors observed at Allahabad on the 10th of August, 1842. By Capt. SHORTREDE, 1st Assistant, Grand Trigonometrical Survey of India.

The following observations were made at Allahabad, for the purpose of comparing them with corresponding observations to be made at Agra, but the gentleman at whose suggestion the observations were undertaken, was unable, from sickness, to take an active part in the business. Though the primary object was thus frustrated, it may be worth while to record these observations, with a view of calling the attention of those who may have opportunities of making similar observations about the 10th of August and 13th of November next.

The first step towards a knowledge of these meteors is a large collection of facts, and it is not to be overlooked, that in this country we have advantages for such observations which are scarcely equalled in any other part of the world, owing to the general clearness of our sky, the extent over which observations can be made, and the facility of intercourse by our common language, and the post routes everywhere.

The observations themselves are very easily made when a person knows exactly what he has to do, and does not allow himself to be distracted by attempting too much. Besides general attention, the most useful qualification I believe to be, the ability readily to estimate altitudes at sight. I know by experience, that persons in the habit of such observations, may train themselves to estimate altitudes at sight within 2° of the truth, for I have practised it along with another person, proving our estimates by an altitude and azimuth instrument. In the present observations, the altitudes I believe to be within 5° of the truth, and the azimuths within 15° . But as the meteors come sometimes very quickly after each other, there is no time for deliberation, and it becomes necessary to write down at once whatever is to be recorded, so as to be ready for the next.

In order to judge of the azimuths, I had my cot put in an open place, and laid duly East and West, because I had a straight road, with well marked objects in that direction. I lay on my back, and had a faint oil light on the ground, just sufficient to let me see my watch and what I was writing. I wrote lying on my back, and holding the paper over my head, and in this way saw several meteors which otherwise would have passed unnoticed.

It is an obvious fact, to whatever conclusions it may ultimately lead, that a considerable majority of these meteors have a Westerly course in or near to the Zodiac. Such being the case, it is desirable that some observers should be situated as nearly as may be at right angles to the Zodiac, and at considerable distances from each other, in order that the errors in estimating the altitudes have the least possible effect on the computed heights from the surface of the Earth.

In order that meteors observed at distant places may be readily identified, it is desirable that observers should set their watches either to mean or to apparent time, by means of an astronomical observation, or by a well-set sundial. Provided it be distinctly stated, whether the watch shews mean or apparent time, it is of no great importance which is used; though as a general rule, apparent time is the most convenient for meteorological observations, because the tides, &c. of the atmosphere, like those of the ocean, have a direct relation to the apparent, rather than to the mean course of the sun.

Appt. Time of Obser.	Origin.		Course.	Length.	Remarks.
	Alt.	Az.			
h. m.					
11-18	70°	S. W. }	Nearly vertical.	25°	Faint.
11-23	40	S. W.	Vertical.	10	Very faint.
11-34	45	S. W.	..	15	Faint.
12-20	70	S.	..	..	Splendid from meridian 20° S. of Zenith towards 20° S. of Jupiter, train visible for one or two seconds.
12-23	..	..	..	5	Very small; from 20° S. of Zen. towards Jupiter.
12-27	..	..	..	8	From 15° N. of Zenith towards Jupiter, faint.
12-39	45	N.	West	10	Small.
12-41	70	..	W. 20 N.	6	Faint, ended at 10° S. of α Cygni.
12-42	..	..	N.	10	From Milky Way between α Cygni, and α Pegasi. Sky clear, 25° above horizon.
12-50	90	..	N.	8	Faint.
12-54	45	N.	..	..	Very faint, towards α Cygni.
12-58	..	..	Westerly	..	From 10° E. of α Pegasi.
12-59	32	N.	..	..	From 8° above Pole-star: faint.
13-00	..	..	Westerly	..	From 20° N. of α Pegasi: faint.
13-04	30	W. 20 S.	W. 35 S.	..	..
13-08	50	W. 15 N.	W. 25 S.	10	Faint: cloudy towards N. and heavy E.
13-15	80	S.	S. W.	15	Faint.
13-19	24	N. 5 W.	N. W.	5	Faint: from 5° N. of Altair.
13-22	..	..	W. N. W.	5	..
13-25	40	N.	W.	15	Faint.
13-28	65	N.	N.	10	Very faint.
13-30	60	S. W.	S. W.	10	Brilliant.
13-30 ¹	70	S.	W. 20 S.	45	Rather bright, but short.
13-39	20	W.	W.	..	From 8° S. of α Cygni.
13-48	35	W. 20 N.	..	..	Faint from near Zenith towards S. W.
13-49	..	..	..	..	From 15° S. of α Cassi, cross meridian from 10° E. of Zen. to 40° below Zen. towards 40° S. of Jupiter.
13-56	..	..	..	..	Towards Fomalhaut.
13-57	60	S.	S. 20 W.	..	..
14-01	75	N.	..	..	Towards 30° W. of Fomalhaut.

Appt. Time. of Obser.	Origin.		Course.	Length.	Remarks.
	Alt.	Az.			
h. m.					
14.02	90	S. W.	..	..	Another? uncertain.
14.04	..	..	..	..	Two from near Zenith, towards 20° W. of Fomalhaut: both faint.
14.04½	..	..	..	..	Three within 20°s; 1st and 3d from 10° W. of Zen. towards Jupiter, length 20° 2d Northwesterly.
14.08	45	S. W.	..	..	Towards 5° S. of Fomalhaut.
14.09	..	..	..	..	From 15° S. of Altair to 10 S. of Jupiter.
14.12	..	..	..	..	..
14.13	40	S. 6½ W.	S. W.	..	Three; two of them S. W., the other N. N. W., generally altitude about 40° at origin.
14.14½	60	..	S. W.	25	..
14.17	..	S. W.	..	..	One S. W.; direction S. W. oblique.
14.18	..	N. W.	..	..	One N. W., nearly vertical.
14.18½	40	..	W.	..	10° N. of Altair, direction West, vertical. Sky clear towards N., cloudy in E. horizon.
14.19½	45	S.	S. W.	..	..
14.22	60	S.	..	..	Bright from 30° S. of Zenith towards 15° E. of Fomalhaut.
14.23	..	..	W.	..	In Milky Way near α Pegasi.
14.24	..	..	..	..	..
14.26	70	S.	..	..	Two, 20° S. of Zenith, direction S. W.
14.26½	70	S.	..	..	One N. W.; somewhat uncertain.
14.27½	..	..	..	..	From α Arietis.
14.28½	..	..	S. W.	..	..
14.31	75	S.	..	..	From 15° S. of Zenith towards α Ceti.
14.32	45	S. W.	S. W.	..	From alt. 45° S. W. to 2° N. of Fomalhaut.
14.34	90	..	..	..	Brilliant from Zenith to between Fomalhaut and α Ceti; train luminous for about 10 seconds.
14.35	50	N. W.	..	..	In Milky Way at 40° N. W. from Zenith, direction in Milky Way Westward.
14.39	50	S. S. W.	..	..	Towards Fomalhaut.
14.42	..	..	..	..	Small, at 35° about α Cygni in Milky Way.
14.44	80	..	N. E.	..	Corruscating in Zenith, direction N. E.
14.44½	..	S.	S. W.	..	From 10° S. of Zenith.
14.48	..	..	W. 35 S.	..	From 10° S. of α Cass. direction W. 35° S.
14.49½	..	..	..	..	From N. of Zenith towards Ceti. Cloudy and heavy all around, except to N., Left off observing.

Memorandum on the "Bora Chung," of Bootan. By A. CAMPBELL, Esq., Superintendent, Darjeeling.

Fukeergunge, right bank of the Teesta, January 25, 1843.

The announcement of any extraordinary fact connected with the habits of men or the lower animals, produces three states of mind in the mass of those addressed; 1st, an unenquiring and implicit credence; 2nd, wonder, without any lasting attention to the matter narrated; and 3rd, sceptical disbelief. I have no doubt that the notice of the "Bora Chung", by Dr. Pearson, in Vol. VIII. of the *Journal of the Asiatic Society*, p. 551, produced all these states, in a great number of readers, for I have heard many express themselves to this effect; and I confess, that although I did not disbelieve the account of this fish's habits, I have been very anxious to make further inquiry into them. When in Bootan last year, it was out of my power to do so, but this year I have been more fortunate; and the following is the substance of the information I have gained:—The "Bora Chung" is not found on the right bank, or Rungpoor side, of the Teesta; it is confined to the Bootan side. It inhabits jheels and slow running streams near the hills, living principally in the banks, into which it penetrates from one foot to five or six. The tubes leading from the water into the banks are generally a few inches *below* the surface of the water, and consequently filled with water; they are sometimes of no greater diameter than sufficient to receive the fish, sometimes they are a foot wide; when of the smaller size, they terminate in a basin where the fish remains, returning to the water at pleasure. The usual mode of catching them is by introducing the hand under water into these recesses; two fish are generally found together, and they lie coiled up horizontally, resembling a wheel. They are eaten by the people of the Bootan Dooars, and are quite wholesome. It is not believed that they bore their own holes, or form their resting basins, but that they occupy the abandoned locations of land crabs. When in the waterpool or streams, they always remain close to the margin, and constantly move out and in, of their holes. They never leave the water, nor can they move on the grass more than any other fish. They are supposed to breed in the recesses described.

I have not as yet succeeded in getting specimens of the "Bora Chung," but expect to do so. I saw those sent from Darjeeling to Calcutta for Dr. M'Clelland. They were each about twelve inches long, of a dark brown colour, and scaly. If Dr. M'Clelland described them, they must be sufficiently known to Naturalists; but they may not have reached that gentleman; or, if so, their fate has been similar to that of fourteen species of fish collected in the Bootan Dooars last year, and forwarded by me to Calcutta for Dr. M. I have not had any acknowledgment of their receipt, and I conclude, therefore, that they never reached him.

Proceedings of the Asiatic Society.

(Friday Evening, 7th October, 1842.)

Dr. J. HÆDERLIN in the chair.

W. H. ELLIOTT, Esq., C. S., proposed at the former Meeting, was ballotted for, and unanimously elected a Member of the Society.

Ordered,—That the usual communication of his election be made to Mr. ELLIOTT, and that he be furnished with the rules of the Society for his guidance.

Library.

The following Books were presented :—

Books received for the Meeting of the Asiatic Society, on the 7th October, 1842.

The Calcutta Christian Observer, September and October, 1842. New series, Vol. iii. Nos. 33 and 34. Presented by the editors.

The Calcutta Christian Spectator, July 1842. Vol. iii. No. 7. Presented by the editors.

The Calcutta Literary Gleaner, October 1842. Vol. i. No. 8. Presented by the editors.

Proceedings of the London Electrical Society, 1841-42. Part iv. Presented by the Society.

Wilson's Antiquities and Coins of Afghanistan. London, 1841, 4to. (7 copies.) Presented by the author.

Wilson's Sanskrit Grammar. London, 1841, 8vo. (4 copies.) Presented by the author.

Ibraheem's Grammar of the Persian Language. London, 1841, 4to.

Ballantyne's Grammar of the Marhatta Language. London, 1839, 4to.

Ballantyne's Elements of Hindi and Braj Bhākhā Grammar. London, 1839, 4to.

Ferishta, (in Persian), fol. 2 vols.

Read letter from Moulvie ABDULLAH, of 6th instant, submitting a copy of reprint of the 2nd Volume of the "Futawa Alumgiri," for inspection, and soliciting orders for the delivery of the copies to the Mohafiz of the Asiatic Society.

The vol. made over to the Moulvie of the Society for examination and report.

Read a letter of 31st March, 1842, from CHAS. V. WALKER, Esq. Honorary Secy. Electrical Society, presenting a copy of part 4th of the Proceedings of the Society, and requesting notice of its safe arrival, and of any regular channel through which to receive the future numbers.

Ordered,—That the thanks of the Society be communicated to the Electrical Society, and that Messrs. ALLEN & Co. of London, be named to Mr. WALKER, as the channel for the receipt and transmission of all future numbers to the Asiatic Society.

Read letter from Mr. V. TNEGGEAR, of 8th September last, suggesting with reference to a Report of a Committee of Scientific Men appointed to consider the weights and measures at London, who recommend the decimal system, that a similar reform be proposed in Indian Coins, &c. ; also suggesting the change of title of the Society from that of the Asiatic Society of Bengal to the Asiatic Society of India.

Ordered,—That the first suggestion be referred to a Member of the Society competent to the task, to report on the feasibility or otherwise of the proposed introduction in India, to enable the Society to judge if it could go up to the Government with the proposal ; and that as regards the second, the Society is of opinion, that the change was not desirable.

Read letter from Dr. J. HÆBERLIN, of 7th instant, intimating that according to the request of the President, he had examined the MS. work prepared by Dr. WISE, entitled "A Commentary on the Hindu System of Medicine," that the publication would form a most valuable addition to our store of knowledge, and might become a very useful auxiliary in many respects in the Researches of India ; but that he was of opinion the Society should not publish the work at its own expence, but rather subscribe as liberally as it may think right for a certain number of copies.

Referred to the Committee of Papers.

Read the following letter of 7th instant, and enclosures from Major W. Hough.

To H. TORRENS, Esq., *Secretary to the Asiatic Society.*

SIR—I do myself the honor to request you will submit a "Chinese Life Preserver," to the President and Members of the Asiatic Society, to meet this evening, together with the accompanying drawing, and explanatory paper. I shall be glad if it meets with the approbation of the Society, and that it may, by its public notice, be brought into general use.

I have the honor, to be, Sir,

Your obedient servant,

Calcutta, Spence's Hotel,

7th October, 1842.

(Signed)

W. HOUGH, Major.

Report* of a Special Board of Officers assembled at Barrackpore on the 23rd September 1842, by order of Major General Littler, Commanding, to test and report upon two Bamboo Floats, or Life Preservers, submitted by Major W. Hough, with a view to their being used, under the sanction of Government, in fleets of Troop-boats, when proceeding on the river, for the preservation of lives, in case of wrecks, or other accidents.

President.

Captain R. Smith, 28th Regt. N. I.

Members.

Captain Powell, M. B. and Capt. Tierney, 28th Regt. N. I.

The Committee have duly tested the Bamboo Floats submitted to them, and are of opinion, that in the event of a wreck or other accident, the use of the small one would save the life of any man who was unable to swim, "if properly fastened on," as it is sufficiently buoyant to keep the head and part of the neck above water, without any exertion on his part.

The large Float is capable of supporting four people by merely placing their hands on it, which causes it to sink six inches, and will bear the weight of three persons sitting upon it; but this plan appears objectionable, as it tilts up in every direction and throws them off, which would be very dangerous to those who could not swim; but were there two or three practised swimmers to guide and keep it steady, it might be capable of saving women and children.

These floats ought to be made of very dry kaguzee bamboos, each piece to have two or more knots, according to the size, which will make them the more buoyant.

A small "Jhalee," or Frame-work, introduced over the centre square of the large floats, upon which women and children might be placed, would tend to the preservation of life.

(Signed) RALPH. SMITH, Capt. and President.

JOHN POWELL, Capt. and Member.

E. T. TIERNEY, Capt. and Member.

(Signed) J. H. LITTLER, *M. General,*

Commanding at Borrockpore.

(True Copy,) W. HOUGH, *Major.*

Note from C. B. GREENLAW, Esq.

Secretary to the Marine Board.

MY DEAR HOUGH,—Many thanks for the Life Float. I think it the most admirable I ever saw. No ship ought to go to sea from any place where bamboos are procurable, without a quantity of them on board.

Yours &c.

(Signed) C. B. GREENLAW.

(True Copy.) W. HOUGH, *Major.*

Government House, 7th October, 1842.

[*Extract.*] DEAR SIR,—“I am directed by the Hon’ble the Deputy Governor of Bengal, to thank you for the inspection of the Life Preserver, of which he highly approves.

* A copy sent by the General to the Commander-in-Chief.

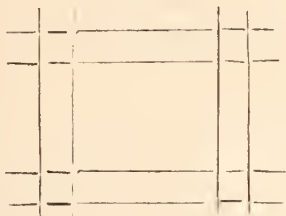
If you will have the goodness to forward it with an official letter to the Secretary to Government, it will be adopted by Government." (Signed) H. SPOTTISWOODE,
To Major W. HOUGH, Calcutta.

Military Secretary.

(True Copy.) W. HOUGH.

Origin of the use.

"In the year 1730, I was passenger in a ship from Batavia to China, 400 tons, (the Pridaæ, Francisco Xavier, Commander,) freighted by English, Chinese, and Portuguese. Near the Coast of China we met with a Tyfoon, (Taufong), which carried away all our masts, bowsprit, and rudder; six feet water in the hold — expecting every moment the ship would founder. The English and Portuguese stood in their shirts only, ready to be thrown off; but the Chinese-merchants came upon deck in a bamboo habit, which had lain ready in their chests against such dangers, and it was thus constructed; four bamboos, two before and two behind their bodies, were placed horizontally, and projected about twenty-eight inches. These were crossed on each side by two others, and the whole properly secured, leaving a space for their bodies; so that they had only to put it over their heads, and tie the same securely, which was done in two minutes, and we were satisfied they could not possibly sink. The shape is given below."—*From a letter to the Author of the Seaman's Preservative. Annual Register, vol. iv. 1761, p. 141.*—"Useful Products." (True Copy.) W. HOUGH.



In 1834, the above was published by me, but not in a form to attract general attention. It occurred to me that I might save the two minutes, above noticed, by forming the "Life Preserver," at once, into two squares, ready for immediate use.

It seems to be adapted for use by fleets of Troop-boats, proceeding up or down any river, or in the case of Troop-transports, or indeed, for ships generally, for either boats or ships wrecked in the middle of a river, or at sea, or coast, or ashore, it will render safe many valuable lives. The soldier or sailor, may place it under his cot or hammock. If made on a larger scale, it might be the means of saving boxes, containing valuables or papers, now, often lost in boats proceeding up the Ganges, &c.

The loss last month of two officers, sixty-eight men, six women, twelve children, of H. M's. 50th and 62nd Regiments, and a great number of natives, suggested to me to request Major General Littler, commanding the Division, to test its use before a Committee, which assembled in his presence. I since submitted it to Government for immediate adoption, a division of the 9th Lancers being on the eve of departure from Calcutta to Allahabad by water. I had often tested its utility myself, but I thought

that a formal report would be more satisfactory; and it has been reported to His Excellency Sir Jasper Nicolls, Commander-in-Chief in India.

W. HOUGH, Major.

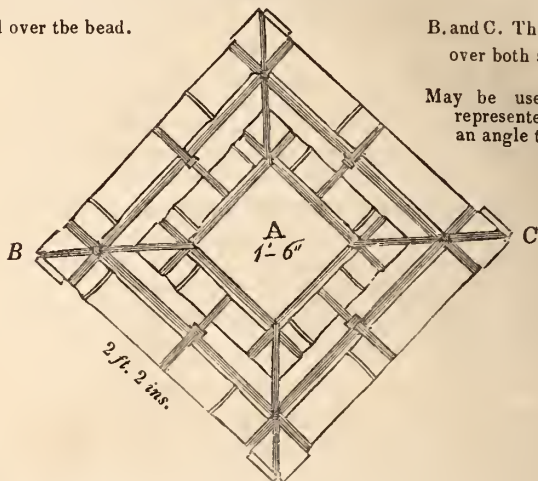
Calcutta, 7th October, 1842.

The Chinese "Life Preserver," as modified by Major HOUGH. First known to the English in 1730, vide *Annual Register*, Vol. 1, 1761, p. 141.—"Useful Projects."

A. Placed over the bead.

B. and C. The armsthrown over both squares.

May be used as above represented; or with an angle to the front.



To be made of kaguzee bamboos. The knots to be cut just at the ends; if in the middle between two knots, water would get in and make them less buoyant. The frame of eight bamboos is fastened by string at the angles, and in the centre of the sides, and should be tarred, or dammered over, to prevent the string becoming rotten. There should be a strong wooden pin to fasten the bamboos at the angles. The above is made with two knots in the inner square, of large bamboos, the outer may be of common bamboo. Those of three knots would support three or four men. Smaller might be made for children. By fastening a rope to the float, and then to the arm, or round the body, it never can drift away.

W. HOUGH, Major.

Calcutta, 7th October, 1842.

Read the following letter addressed to the Secretary by M. Garcin de Tassy.

MONSIEUR,

Paris, 53 Rue St. André des Arts, ce 9, Juillet 1842.

Sous les auspices de mon honorable ami M. J. B. Tassin, qui m'a fait l'éloge de votre caractère serviable, je prends la liberté de m'adresser à vous pour vous exprimer le desir que j'ai d'obtenir une *Biographie originale des Poètes Hindous*, si un pareil ouvrage existe. Le *Bhakta mál*, dont M. W. Price a publié de nombreux extraits, peut jusqu'à un certain point remplacer cet ouvrage, puisque la plupart des chefs des sectes Hindous dont il y est questions ont auteurs de poésies Hindous. Mais je n'ai pas cet ouvrage complet; s'il existait à Calcutta et qu'on peut en avoir une copie, je vous serais bien obligé de me la procurer. Pourriez-vous aussi me procurer quel-

ques poésies de Kerbir accompagniées d'une traduction en *Urdû*, ou du moins de quelques notes, interlineaires, ou marginales, soit en *Urdu*, soit en Hindi ou en Persan? Vous n'ignorez pas que ces poésies, très remarquables du reste, sont fort difficiles à entendre. J'ai un MS. complet du *Bijak* qui en est la collection, mais une commentaire ou une traduction me serait souvent fort utile. Y aurait-il enfin moyen d'avoir un commentaire Hindi, ou une traduction *Urdû* du célèbre Ramâyân de Tulsidas qui a été imprimé plusieurs fois à Calcutta? J'acquitterais de la manière que vous voudriez bien m'indiquer les frais que vous feriez pour moi, si vous avez la bonté de vous charger de ces recherches, ainsi que je l'ai fait dans le temps envers l'excellent M. J. Prinsep qui eut la bonté de faire copier pour moi plusieurs MSS. de la Société Asiatique. A cette occasion je dois vous dire qu'il y en a un, je crois, dont on ne m'a jamais réclamé les frais de copie. Si vous en avez connaissance, je serais bien aise de m'acquitter et je m'empresserais de la faire au premier avis.

Les renseignements que je prends la liberté de vous demander et les nouvelles copies que je sollicite sont destinées à augmenter les matériaux du 2d volume de mon Histoire de la Littérature Hindouï et Hindoustâni. La partie Hindouï est sans nul doute la plus intéressante. Malheureusement c'est surtout celle qui laisse le plus à désirer. Vous contribuerez à rendre mon ouvrage plus complet sous ce point de vue si vous voulez bien continuer d'avoir pour moi la même bienveillance dont m'honorait M. J. Prinsep.

De mon côté je m'estimerais heureux de vous être bon à quelque chose, tant à vous en particulier, qu'à tous les membres de la Société Asiatique de Calcutta, dans vos rapports avec l'Institut de France, ou avec la Société Asiatique que dont je suis Vice President. J'ai l'honneur d'être

Monsieur,

Votre bien dévoué serviteur,

GARCIN DE TASSY.

Read the following Report from the Curator :—

SIR,—On the present occasion, I have little to Report to the Meeting.

A fine, nearly full-grown, male of the white-browed Gibbon, or Hoolock, (*Hylobates hoolock*, Harlan,) has been received from Barrackpore, its skin has been mounted, and the entire skeleton has been set up. The deep black colour of this specimen contrasts strikingly with that of the mingled brown and blackish female noticed in the Society's Journal, Vol. X, 838, while the latter is much darker than in that styled *H. choromandus* by Mr. Ogilby, as this, in its turn, is deep-coloured in comparison with the pale skin obtained by Dr. Walker, which I exhibited at a former Meeting of the Society.

By C. S. Gullevie, Esq., the Society has been presented with a small collection of very interesting mammalia and birds, procured upon the Munipore Hills, on the eastern frontier of Bengal. The following species are comprised, of which those new to us I mark, as usual, by prefixing an asterisk.

Sciurus bicolor; an individual renewing its coat, and acquiring its hyemal dress, the hairs of which are longer, finer and less glistening, and of a considerably paler colour, than those of its summer garb, insomuch that the animal assumes a variegated appearance during the period of transition, the change commencing on the croup.

* *Sc. erythrogaster* (?), Nobis, *N. S.*? Size of the British Squirrel, or a little larger, and having a much longer tail. Entire upper-surface glistening deep reddish-black, minutely grizzled with light fulvous or yellowish-brown, each hair having thus two small annulations: the whole under-parts, from the throat, and inside of the limbs, a rather dark, but not intense, reddish-maroon: feet black with little trace of annulation; the fulvous predominating most about the head: tail similar to the back for the basal third, then gradually less grizzled, and the terminal half black, almost without grizzling; moderately bushy: whiskers black: ears not pencilled. Length nine or ten inches; the tail without its hair as much more, and with it upwards of two inches additional; tarsus, to end of claw of longest toe, two inches and a quarter.

* *Buceros Nipalensis*, Hodgson, *As. Res.* XVIII, 178: a magnificent pair, male and female, of this splendid species, — the male having the head, neck, and breast, uniform rust-colour, paling on the crown, and the belly and thighs deep reddish bay.

Picus strictus (?), Horsfield, *Lin. Trans.* XIII, 176; *P. Sultanus*, Hodgson; *P. strenuus* (?) Gould. I have doubtfully followed Mr. Jerdon in referring this species to *P. strictus*, Horsfield, which is very briefly described (*loc. cit.*), and although the latter part of the statement "*Pileus maris coccineus, feminae aurantius*," does not apply, inasmuch as the female of this Indian bird (which I have obtained in the vicinity of Calcutta) has the occiput black with round white spots. I am tolerably confident of its being the *strenuus* of Gould, included by Dr. Horsfield in his Catalogue of Assamese birds procured by Dr. McClelland; and there is a figure of it among the latter naturalist's drawings of his specimens.

Polyplectron chinquis.

From Dr. Spry,

Four specimens of a *Draco*, from Tenasserim.

From Mr. Peter Virre,

Hemidactylus: a species new to the collection, taken in Calcutta; the individual having a double tail.

Numerous specimens of various kinds have also been collected and set up, but not any requiring particular notice.

I am, Sir,

Yours obediently,

EDWARD BLYTH.

P. S.—The Mongoose from the Neilghierries, noticed in my last Report (p. 880), appears to be the *Herpestes fusca*, Waterhouse, *P. Z. S.* 1838, p. 55: it is less allied to Mr. Hodgson's *H. auropunctata* (which I have just received from that naturalist), than I had anticipated.—E. B.

The President forwarded for the Museum of the Society, two specimens of *Ornithorhynchus Paradoxus*, received by Mr. C. R. PRINSEP, from Van Diemen's Land.





For use in Library only

